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Agricultural cooperatives as a means for agricultural development: the case of western Sudan small farmers' cooperatives

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Muneer, Siddig El Tayeb, Ph.D.

Iowa State University, 1989

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Agricultural cooperatives as a means for
agricultural development: The case of western Sudan
small farmers' cooperatives

by

Siddig El Tayeb Muneer

A Dissertation Submitted to the
Graduate Faculty in Partial Fulfillment of the
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CHAPTER I. INTRODUCTION

Agriculture is one of the most important occupations all over the world. In 1986, 48% of the world's total economically active population was working in agriculture and 47% of the world's population depended on agriculture for their livelihood. Such people are defined as the agricultural population (Food and Agriculture Organization, 1986). The importance of and dependence on agriculture is even greater in the less developed countries. Indeed, more than 60% of the population in such countries depends on agriculture for their livelihood (Cairncross, 1980).

As in other less developed nations, dependence on agriculture is an important feature of the African economy; the agricultural sector supports 62% of the population and provides employment for 65% (FAO, 1986). Agriculture in Sudan plays a crucial role and constitutes the backbone of the country's economy. This sector in Sudan is divided into three main subsectors. The irrigated subsector consists of 18.5%, the mechanized rainfed subsector comprises 37.2%, and the traditional subsector constitutes 44.3% of the total cultivated area (Technoserve Inc., 1987). The traditional subsector has the lowest land and labor productivity (Ministry of Agriculture and Natural Resources, 1987).

The problem of low productivity and low agricultural production of small traditional farmers is a universal one that is receiving increasing attention from development scholars, development agencies, and political leaders

(Chambers, 1983; Kahn, 1978; Norman et al., 1979; FAO, 1985; International Fund for Agricultural Development, 1984).

Therefore, this study will critically examine the potential of agricultural cooperatives as a means to reach small farmers and increase their agricultural production.

Many agricultural development approaches and programs (for example, the Green Revolution, integrated rural development, farming systems research, training and visit extension systems) have been advanced to and tried by Third World countries (Flinn, 1982). Also, much research has been conducted to evaluate these programs and to provide remedies for their failures (Karim, 1986; Williams, 1982). But in the literature on rural and agricultural development, there are different opinions on the consequences of various development strategies and programs. Some scholars believe that these development programs will eventually benefit everyone even if they did not do that in their first years (i.e., the trickle down effect) (Karim, 1986). The supporters of this view argue that, although these programs (e.g., the Green Revolution) have caused some income differentials, the gains from the increased agricultural production have sufficiently trickled down to cause a consensus on the choice of an evolutionary pattern of rural and agricultural development, which does not question the status quo and does not attempt to alter the political and economic institutions nor the possession of desired

resources in favor of disadvantaged people, rather than a revolutionary pattern, which aims at changing the status quo and altering the possession of desired resources (property and power) in favor of the previously excluded sectors (Karim, 1986; Appelbaum, 1970).

On the other hand, there is another camp that suggests that most of the rural and agricultural development programs have harmful effects on the poor and small farmers (Chambers, 1983). Describing the consequences of the Green Revolution, Karim (1986) indicated that most of the available literature suggests that it did not benefit small, poor farmers; instead, it increased regional inequalities and income gaps. No matter what other differences occur, there is agreement among scholars about the inability of the different programs to reach and benefit the small, poor farmers at least at the initial stages.

One of the popular but controversial agricultural development strategies is the establishment of agricultural cooperatives (Naghizadeh, 1984). Although such cooperatives are proposed and adopted by many Third-World countries (e.g., India, Iran, Tanzania) as a means for agricultural development, the literature about their success and failure is not conclusive. This is mainly due to the twofold nature of the problem of using agricultural cooperatives as a means for agricultural development: first, the inability of development programs to reach small and poor farmers and,

second, the lack of incentives for cooperative members to work hard and produce more (Putterman, 1985).

In Sudan, there is an increasing emphasis on the role that agricultural cooperatives can play in the development of the agricultural sector. This is reflected in the government policy of establishing new agricultural cooperatives, rehabilitation of the existing ones, and the conversion of some of the government agricultural schemes to agricultural cooperatives owned by farmers (Van Dooren and Kerkhoven, 1987; Ministry of Finance and Economic Planning, 1988). This increasing interest in agricultural cooperatives in Sudan in particular and in Third-World countries in general suggests the need for research that critically examines the performance of different forms of agricultural cooperatives under different conditions so that an inductive grounded theory for agricultural cooperatives' role in agricultural development can be developed. Therefore, this study is intended to examine the role that agricultural cooperatives played in the development of the traditional agricultural subsector in Northern Kordofan province in Sudan.

Significance of the Study

There is a growing recognition that if Third-World countries are to achieve lasting development, special attention has to be given to modernization of traditional small farmers so that their agricultural production can increase (Kahn, 1978; Norman et al., 1979). Therefore,

there is need for a development strategy that can reach the small, traditional farmers. Along this line, the government of Sudan hopes that agricultural cooperatives can play this role; this is reflected in the emphasis on cooperatives in the government's agricultural development policy.

Therefore, by critically examining the success and failure of agricultural cooperatives in Northern Kordofan province, this study can make policy recommendations that may help guide government policies using cooperatives as a means for agricultural development. Also, this study will provide insights to development agencies, other developing countries, and those who are concerned with rural and agricultural development as to the potential of agricultural cooperatives in reaching poor farmers and increasing their agricultural production. Contributions may be made to the solution of the persistent and traditional problem of rural and agricultural development strategies, namely, how to reach the rural poor. Also, this study will provide practical knowledge about problems of conducting research in rural areas of developing countries.

The Present Study

To gain a better understanding of how the agricultural cooperatives can help small farmers to counteract the exploitation to which they are exposed, to modernize their agriculture, to increase their agricultural production, and to improve their living conditions regardless of their

socioeconomic status, the relationship between household socioeconomic status and cooperative membership and the direct and indirect effects of both on the household's agricultural production and living conditions will be examined. The data to be used in this study were collected through face-to-face interviews with a stratified sample of 183 agricultural cooperatives' members and non-members farmers in the Um Ruwaba area of Sudan.

Organization of the Study

Some introductory remarks about the study have been made in this Chapter. In Chapter II, an introduction to agriculture in Sudan will be provided, literature on the use of agricultural cooperatives as a means for agricultural development will be reviewed, and the theoretical base for the analytical model to be used in this study will be explored. In Chapter III, the theoretical hypotheses will be operationalized and methodological and analytical techniques will be described. Chapter IV will deal with findings and discussion. Conclusions, policy recommendations, and suggestions for further research will constitute Chapter V.

CHAPTER II. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

This chapter is divided into three main sections. Introductory remarks are made about agriculture in Sudan in the first section. In the second part, the literature on cooperatives and the use of them as a means for agricultural development is reviewed with emphasis on Third-World countries. In the final section, development theories relevant to this study will be reviewed, a theoretical synthesis for developing an analytical model to be used in this study will be made, and theoretical hypotheses will be proposed.

Agriculture in Sudan

In 1986, the Food and Agriculture Organization of the United Nations (FAO) estimated that 65% of Sudan's population depended on agriculture; the agricultural sector provided employment for about 65% of the economically active population. In economic jargon, the agricultural sector in Sudan provided 32% of the Gross Domestic Product (GDP) (Table 1) and 85% of the country's export earnings (Bank of Sudan, 1986).

Table 1. Share of agriculture in GDP of Sudan in the years
1981/82 - 1985/86 (in millions of L.S.;
1\$ = 4 L.S.)^a

<u>Year</u>	<u>1981-82</u>	<u>1982-83</u>	<u>1983-84</u>	<u>1984-85</u>	<u>1985-86</u>
Value	2,062	2,320	2,664	2,792	4,486
Percentage	30	31	31	26	32

^aBank of Sudan (1986).

Despite the recognition of the importance of agriculture by Sudanese authorities, government investment in the agricultural sector is very limited. In 1987, the Ministry of Finance and Economic Planning in Sudan estimated that the agricultural sector provided a livelihood for over 80% of the country's population and contributed around 90% of the country's foreign exchange earnings; it received only about 28-32% of the national budget allocations, however. And the agricultural sector obtained less than 1% of the credit in Sudan (Technoserve Inc., 1987). This marginalization of the agricultural sector in Sudan and many other developing countries in terms of government investment may be the main cause of these countries' backwardness, food crises, and low living standards of the majority of their populations. As a result of this lack of modernization of the agricultural sector, the less developed countries have changed from being net exporters of food as recently as 1950 to net food importers now (Cairncross, 1980). Cairncross (1980) also indicated that to try to explain the food crises in the less developed countries by the population explosion is a distortion of the problem; more important are the low levels of agricultural technology and the lack of incentives for farmers to produce. The situation of the traditional and small farmers vis-a-vis other farmers in the less developed countries is even worse than that of the agricultural sector in general. These traditional and small

farmers have inadequate access to productive resources, to credit institutions, and to technology; and they have very little or no bargaining power in the market (FAO, 1975).

The agricultural sector in Sudan is divided into three main subsectors. The irrigated subsector consists of 18.5%, the mechanized rainfed subsector constitutes 37.2%, and the traditional subsector comprises 44.3% of the total cultivated area and each subsector produces 50.3%, 35.4%, and 14.3% of the total agricultural production, respectively (Technoserve Inc., 1987). The irrigated subsector is composed of large government schemes (e.g., Gezira, Rahad, Kenana) and private pump schemes located along the Nile River and its branches. In this subsector, the main crops grown are cotton, groundnuts, sugar cane, wheat, and sorghum. The mechanized subsector consists of large schemes (1000-1500 Feddans; 1 acre = 1.1 Feddans) that are either government or privately owned. These schemes are located in the eastern and Kordofan regions. This subsector mainly produces sorghum with limited areas of millet and cotton. Mechanization is used for land preparation and to a limited extent in harvesting. The traditional subsector is defined as any farming that uses neither mechanization nor irrigation technology (Technoserve Inc., 1987). The farmers in this subsector produce sesame, groundnuts, and gum arabic as cash crops and sorghum and millet as food crops.

In 1986-1987, 7% of the sorghum area was in the irrigated subsector, 69% in the mechanized subsector and 24% in the traditional subsector; and they provided 14%, 73%, and 13% of the sorghum total production, respectively. In 1987-1988, the irrigated subsector included 8%, the mechanized subsector 65%, and the traditional subsector 27% of the sorghum area and they provided 25%, 65%, and 10% of the sorghum total yield, respectively. The traditional subsector is almost the sole producer of millet. In the 1986-1987 and 1987-1988 agricultural seasons, it included 98% and 97% of the millet total area and provided 94% and 91% of the millet total production, respectively. The irrigated sector was the sole producer of wheat in 1986-1987 and 1987-1988. The traditional subsector included 82% and 77% of the groundnut total area in 1986-1987 and 1987-1988, respectively, and provided 51% and 41% of the total yield. On the other hand, the irrigated subsector included 18% of the groundnut area in 1986-1987 and 23% in 1987-1988 and provided 49% and 59% of the total yield, respectively. In 1986-1987, 41% of the sesame total area was in the mechanized subsector and 59% in the traditional subsector; it provided 54% and 46% of sesame total production, respectively. In 1987-1988, 45% of the sesame area was in the mechanized subsector and 55% in the traditional subsector and they provided 54% and 46% of the total production, respectively.

Table 2. Total area and total production of some crops in each subsector in 1986/87 and the forecast for 1987/88^a

Crop	Subsector	1986/87		1987/88	
		Area (in 1000 Feddan)	Produc- tion (in 1000 M.T.)	Area (in 1000 Feddan)	Produc- tion (in 1000 M.T.)
Sorghum	Irrigated	830	454	653	359
	Mechanized	8190	2395	5225	940
	Traditional	2793	428	2200	154
Millet	Irrigated	15	5	15	5
	Mechanized	71	11	50	6
	Traditional	3590	269	2215	120
Wheat	Irrigated	282	157	413	230
Groundnut	Irrigated	233	186	320	256
	Traditional	1056	193	1052	178
Sesame	Mechanized	917	117	1032	140
	Traditional	1316	99	1253	118

^aMinistry of Agriculture and Natural Resources, Sudan (1987:6-10).

Despite its importance in terms of people depending on it for their livelihood, the labor force working in it, and its contribution to the country's foreign exchange earnings, the traditional agricultural subsector in Sudan is characterized by rudimentary and traditional means of production (Gregg and Ahmed, 1983). Describing the traditional subsector in Kordofan province, Technoserve Inc. (1987) indicated that farmers in this subsector, with the exception of small quantities of seed dressing and insecticides, used no modern inputs and relied on hand tools and human labor. The traditional subsector receives only a small portion of the credit given to the entire agricultural sector; indeed, this subsector gets only 6-8% of the already meager funds available (Technoserve Inc., 1987).

The lack of modern inputs and the low level of technology in the traditional agricultural subsector in Sudan has resulted in a very inefficient utilization of land and labor when compared with other subsectors (Table 3). In the 1987-88 agricultural season, the land productivity of sorghum was 180 kg/Feddan (Feddan = 1.1 acre) in the mechanized rainfed subsector and 70 kg/Feddan in the traditional subsector; millet land productivity was 120 kg/Feddan for the mechanized rainfed subsector and 55 kg/Feddan for the traditional subsector (Ministry of Agriculture and Natural

Table 3. Sorghum and millet land productivity in the different subsector in the years 1986-87 and 1987-88^a

Crop	Sector	Productivity in kg/Feddan	
		1986-87	1987-88
Sorghum	Irrigated	547	550
	Mechanized rainfed	292	180
	Traditional	153	70
Millet	Irrigated	300	330
	Mechanized rainfed	164	120
	Traditional	75	55

^aMinistry of Agriculture and Natural Resources (1987).

Resources, 1987). And yields were at least six times greater from irrigated than from traditional lands in 1987/88.

These figures contradict the general belief that mechanization leads to higher labor productivity but lower land productivity when compared with labor intensive agriculture. An inevitable result of this low agricultural production in the traditional subsector is a low living standard of a large portion of Sudan's rural people who depend on agriculture for their living.

Despite the lack of government investment, the traditional subsector is the major supplier of some main cash and food crops and the sole producer of others. In 1984, the traditional subsector produced 35% of Sudan's sorghum, 100% of millet, 75% of groundnuts, and 70% of sesame; its contribution to the country's export earnings was 40% (Technoserve Inc., 1987). Therefore, if the traditional farmers are provided with modern agricultural inputs (e.g., fertilizers, improved seeds, pesticides) and education about improved farming techniques, credit, and marketing services, then they are not only expected to improve their living conditions but they are expected to make a substantial contribution to the country's development.

Agricultural Cooperatives

The word cooperation is of Latin origin and it means to work together (Filley, 1929). In practice, agricultural cooperatives are used for various types of farming. The term includes farm organizations in which all means of production are the property of the cooperative, such as the Russian Kolkhoz and Polish cooperatives (Hussain, 1973). It also includes other types of farming systems where the farmers operate their plots separately but they join and cooperate together for certain specific agricultural operations or services. In some cases, the word cooperative is used in a very restricted sense when the government passes certain laws; then the use of the term is restricted to the associations organized under these laws (Filley, 1929).

Cooperatives not only lack a universally accepted definition but also differ greatly in the extent of resource pooling, management, and objectives (Naghizadeh, 1984). This creates some difficulty in applying standard procedures for evaluating cooperatives' successes and failures and limits the generalizability of lessons learned from each particular cooperative. To overcome the problem with the definition of the term cooperative, Naghizadeh (1984:75-76) suggested that "depending on the extent and the nature of cooperative involved, alternative forms of agricultural cooperatives can be ranked into a continuum, from partial

service cooperative to complex and complete cooperative farming." By adopting Naghizadeh's idea of a continuum of cooperatives, the definitional problem can be solved and a grounded theory (Glaser and Strauss, 1980) of cooperatives can be developed. Thus, in this study the term agricultural cooperative is applied to any farmers' organization that performs any joint action for the benefit of its members without harming others (Filley, 1929; Hussain, 1973; Mann, 1978; Naghizaden, 1984). These cooperatives can range from partial service cooperatives to complex and complete cooperative farming depending on the extent of resources pooled and objectives that are to be determined by the specific situations, needs, and value systems of each society (Naghizaden, 1984; Reed, 1977). But this continuum needs to be constructed within certain boundaries so that it excludes non-justifiable joint actions. As Reed (1977) put it, while the experience of other countries can be broadly instructive, the extent and form of cooperatives must be worked out over time in ways suited to each particular situation and geared to serve a felt need. Since research on agricultural cooperatives is primarily policy directed, to achieve the maximum possible effectiveness in providing sound policy recommendations, in addition to paying attention to the specific conditions of each situation, it is also important to have some notion of what constitutes the "oughts" of a good society (Falk and Gilbert, 1985).

Thus, it is the role of development students and policy makers to formulate and define the boundaries within which the cooperative continuum can be established according to the norms and values of each society.

In Islam, the idea of a cooperative continuum is well indicated and its boundaries are clearly set. In the second verse of Chapter 5 (Sura:Maida) of the Quran, it is stated: "Help ye one another in righteousness and piety, but help ye not one another in sin and rancour." The Quran gives a clear message to all Muslims to cooperate--to pray together, eat together, help their neighbors in times of sickness, hunger and hardships, and protect the weak from oppressors, for example (Mann, 1978). So one of the boundaries here for the cooperative continuum is that the act involved should not harm others. Accordingly, any joint act that benefits those who are involved, even if it does not involve pooling of labor, capital, or land, is considered a kind of cooperation but at one end--the simplest type--of the cooperative continuum.

In this study, the cooperatives under consideration involve neither land nor labor pooling; their primary goal is to gather small farmers, after paying registration fees, into groups that are held responsible for the repayment of loans and the costs of other services advanced to them by the Agricultural Bank of Sudan. Although some may find it difficult to consider these as cooperatives, according to

the criteria set here they may be considered a type of agricultural cooperative, but one close to the simple end of the cooperative continuum. They can be defined as farmers' organizations designed to introduce improved methods of farming, joint purchase of inputs, joint marketing, and provision of other services to members, each of whom operates a farm independently (Goyal, 1966; Hussain, 1973).

Agricultural Cooperatives as a Means for Agricultural Development

Generally, a sound agricultural development is one that realizes both increases in agricultural production and justice in its distribution (that is, growth with equity). It is the equity part that seems to be difficult to achieve. The failure of different development strategies to achieve equity in a satisfactory manner argues for a basic-needs approach where the government directly provides all components of welfare to the people; this will lead to the achievement of a widely agreed upon and high priority objective in a shorter time and with fewer resources (de Janvry, 1981). But if it is ever possible to formulate a development strategy that can realize both growth and equity, then it is far more appropriate than the welfare program approach.

The main problem of agricultural development in the developing countries is the inability of the different programs to reach out to the rural poor and, hence, to reduce the income gap between relatively rich and relatively poor farmers. The main concern of almost all development scholars is the bias of development programs towards the relatively rich, educated, and "progressive" farmers and the blaming of the victims of these programs (the poor) and labeling them as not innovative, laggard, and traditional (Lee and Marsh, 1955; Moulik et al., 1966; Base, 1961; Stanfield and Whiting, 1972; Malton, 1979; Chambers, 1983; Gartrell and Gartrell, 1985; Malecki et al., 1976). Therefore, this study is intended to examine the potential of agricultural cooperatives in solving the problem of reaching the rural poor and improving their agricultural production and, hence, their living conditions.

The potential of agricultural cooperatives to solve poor farmers' problems and to be used as a vehicle for agricultural and rural development is recognized by international development organizations, by governments of developing countries, and by development students. During the 14th century, as indicated by Baali (1988), Ibn Khaldun argued that for human beings to live and exist they need cooperation; he added that the use of cooperation to obtain a livelihood is one of the unique qualities that distinguish human beings from other living beings. Furthermore, Ibn Khaldun argued that "because cooperation is essential for

survival of human society, coercion may be used, especially if people are either largely ignorant of, or ignoring, the interests of other human beings" (Baali, 1988:37).

At the present time, the use of cooperatives as a means for development is advocated by several development scholars (Filley, 1929; Lamming, 1980; Naghizadeh, 1984). Drawing from its own practical experience in rural and agricultural development, the International Fund for Agricultural Development (IFAD) (1984) indicated that when poor farmers are organized into cohesive and functional groups they will benefit from the economies of scale, raise their bargaining power, be able to present their needs very clearly, be able to counter the pressures of those who exploit them, and can provide collateral and enforce financial discipline for repayments. Also, the Food and Agriculture Organization (FAO) argued that agricultural cooperatives enabled farmers to assume an active role in determining, as well as carrying out, measures to raise production and productivity; they provide means for distributing income more widely and promote social betterment (Lamming, 1980). Furthermore, the FAO took practical steps for adopting cooperatives as a development approach relevant for small farmers by holding three meetings in 1977, 1978, and 1979 to discuss "1) experiences and models of cooperatives and other rural organizations engaged in agricultural development; 2) increasing agricultural production through cooperatives;

3) improving management systems of cooperatives with special reference to small farmers" (Lamming, 1980:2).

On the national level, many governments believe that cooperatives are the hope for a sound rural development; many adopted cooperative strategy as their agricultural development policy. In India, for example, it was argued that cooperatives would enable small farmers to increase production and reduce production costs; in addition, they would develop group spirit among farmers and reduce income inequalities in the rural sector (Goyal, 1966; Laxminarayan and Kanungo, 1967). The optimism about the potential of agricultural cooperatives to act as a successful means for agricultural development in India went to the extent that in 1949 the Indian Congress Agrarian Reform Committee recommended compulsory cooperative joint farming for cultivators whose holdings were below a basic size and some form of compulsory cooperative farming for the rest (Goyal, 1966). In Tanzania, after independence, it is thought that cooperative production would overcome the economic disadvantages of small scale peasant agriculture and facilitate the provision of social and other services. Therefore, in the first five years after independence (1961-1966), a number of government financed and managed but unsuccessful settlement cooperatives were established (Ellman, 1977). Following the "Arusha Declaration," the emphasis turned to voluntary formation of "Ujamaa" villages

with maximum dependence on the members' efforts both in production and in management (Ellman, 1977). In the Republic of Niger, agricultural cooperatives showed some success in facilitating the marketing of agricultural products and distribution of factors of production (Stewart, 1984). Agricultural cooperatives were also used with success in Dahomey as a means for land reform and rural and agricultural development (Mensah, 1977). In Bangladesh, agricultural cooperatives were considered an effective instrument for increasing agricultural production and attaining distributive justice and for saving farmers from exploitation by traders, middlemen, and money lenders (Hussain, 1973).

At the farmers' level, the potential for agricultural cooperatives to solve farmers' problems was recognized long ago. For example, in the United States, the Grange established cooperatives in 1867 to improve the prices farmers received for their products and to reduce their costs through large-scale purchasing (Nelson, 1969). By serving members during hard times and by providing a voice to obtain desired legislation, the cooperative members in the United States now think of their cooperatives as a protective umbrella; a good example of this is the role that cooperatives played in 1973 when fertilizers were in short supply (French et al., 1980).

But the experience of agricultural cooperatives is not all success. Examining agricultural cooperatives in Bamail village in Bangladesh, Hussain (1973) indicated that although the production cost per acre was slightly lower on cooperative farms than on private farms, the net return per acre was much higher on private farms mainly due to the low productivity on cooperative farms. In Ethiopia, like many other countries, practical experience indicated that the expectations that, as farmers gained experience and benefits from communal farms, they would turn to collective farming proved to be ill-founded and the farmers looked forward to becoming at least masters of their fate, tilling the land as individual proprietors. In their view the basic unit of production should be the family farm (Abate, 1983).

From the literature on agricultural cooperatives emerge some clues that the benefits or returns from cooperatives may follow a pattern similar to that of the law of diminishing marginal returns of economic theory. In other words, benefits from cooperatives at the simplest end of the cooperative continuum may be substantial; as cooperatives move toward the more complex end of the cooperative continuum, their benefits may become questionable or at least less clear as indicated by the experience of many countries. If there is any lesson to be learned from the literature on agricultural cooperatives, it is that extreme pooling of resources should be avoided unless there is an inevitable need for it. The benefits from agricultural

cooperatives in western Sudan are expected to be clear and tangible since very few resources are pooled and hence they are at the beginning of the cooperative continuum.

Cooperatives in Sudan

It is difficult to trace the history and origin of traditional forms of cooperation in Sudan. Still there is strong evidence that with the spread of Islam to Sudan, the spirit of cooperation was founded in the normal way of life. Islam gives a clear message to all Muslims to cooperate and help each other (Mann, 1978). As indicated by Mann (1978), there have been many types of traditional cooperatives (e.g., Nafir, Faza, Muowan, Sanduk) that aimed at organizing people to help each other during times of hardship or need. These traditional forms of cooperatives along with the teachings of Islam (such as help your brother and contribute in cash and kind to the needy and poor) created an atmosphere where the introduction and development of modern cooperatives became relatively easy (Mann, 1978).

Agricultural cooperatives in the modern sense started in the 1930s when a number were established in the northern province to provide farmers with water for irrigation (Mann, 1978; Mohamed, 1985). In 1949, in the course of cooperative development in Sudan, the first Cooperative Societies Ordinance was passed which was then amended several times (Van Dooren and Kerkhoven, 1987). In 1975, a special Ministry of Cooperatives was established; in 1979, it was

merged with the Ministry of Commerce and Supply. As a result of an agreement between the Sudan government, International Labour Organization (ILO), and the United Nations Development Program (UNDP), a Cooperative Training and Development Centre was established in 1976 in Khartoum. In 1978, the Islamic Cooperative Bank was established to sponsor cooperatives (Mohamed, 1985).

The growing interest in cooperatives in Sudan is illustrated by the spread of cooperatives over the country; these cover a very wide spectrum of economic and social activities. At present, there are about 4,725 cooperatives with a total membership of 1,132,213; there are approximately 422 agricultural cooperatives (Mohamed, 1985). These can be classified into eight categories (Mohamed, 1985; Mann, 1978; Van Dooren and Kerkhoven, 1987). First, agricultural cooperative societies provide agricultural services such as irrigation, ploughing, and provision of production inputs, to members who cultivate their plots separately. Second, mechanized rainfed cooperatives were established by the mechanized agriculture corporation with the help of the World Bank. Each cooperative was given an area of 1,000-1,500 Feddans, a tractor, and a planter (the value of which was to be repaid over 10 years). Most of these cooperatives are not working now. Third, mechanized harvesting cooperatives provide mechanized harvesting for

their members. Fourth, agricultural credit cooperatives provide credit, marketing, and storage services to the small farmers in the traditional subsector. These are found mainly in the northern Kordofan region. Fifth, sixth, and seventh are flour mill cooperative societies, milk producer cooperative societies, and consumer cooperative societies, respectively. Other cooperatives, including multi-purpose cooperative societies, constitute the final category.

The Sudan government is putting more emphasis at present on agricultural cooperatives to act as a means for agricultural development. This is reflected in the government policy of encouraging establishment of new agricultural cooperatives, conversion of some government-owned agricultural schemes to cooperatives, and the development of agricultural cooperative societies for unemployed university graduates through which they can get land, credit, agricultural inputs, and machinery (Van Dooren and Kerkhoven, 1987). In its four-year program for agricultural rehabilitation and development, the government allotted L.S. 250,544,281 of its development budget for the improvement and development of the agricultural cooperative subsector (Ministry of Finance and Economic Planning, 1987).

Justifying this shift towards agricultural cooperatives as a means for agricultural development, the Ministry of Finance and Economic Planning (1987) indicated that agricultural cooperatives helped modernize agriculture by

introducing new methods of farming (especially irrigation systems), develop fair production relations, stabilize vegetable and fruit prices (especially in Khartoum), and enabled small farmers to get credit and other inputs and services. As in the other sectors, the agricultural cooperative subsector suffers from many problems (e.g., inadequate infrastructures, mechanical and technical problems, lack of production inputs, lack of finance, lack of education and awareness about cooperatives), and these problems in many cases have led to the failure and stoppage of many cooperatives (Van Dooren and Kerkhoven, 1987). But as indicated by Mann (1978), due to the conducive atmosphere created by Islamic teaching and traditional forms of cooperation, there is a good chance for agricultural cooperatives to play a crucial role in agricultural and rural development in Sudan if these obstacles are overcome. Even in the present situation, there are some cooperatives that showed substantial success. For example, the Wad-Ramli fruit and vegetable producing cooperative is so successful in producing large amounts of good quality produce that it has helped stabilize prices in Khartoum; and it even exports some vegetables (e.g., tomatoes to Sweden) (Mann, 1978). Also, the Wad-Elkerial milk producing cooperative showed very encouraging results; it planned to build a factory for ice cream and cheese, to construct a model village for its members, and to establish a modern marketing center in Khartoum (Mann, 1978). Another example of very successful

agricultural cooperatives are those in the New Halfa agricultural scheme. These cooperatives perform ploughing, harrowing, sowing, and harvesting and provide credit and other production inputs. They formed a local cooperative union that provides transportation to the members, established a flour mill, and established a workshop for tractor maintenance as well as a livestock feed plant to make use of the agricultural by-products (Van Dooren and Kerkhoven, 1987).

Agricultural Cooperatives in Northern Kordofan

Agricultural cooperatives in northern Kordofan started in 1977 as a part of the Agricultural Service Project (ASP) that was financed by the International Development Association (IDA) and the government of Sudan to provide agricultural inputs and services to the small farmers in the traditional agricultural subsector (Ahmed, 1987). These cooperatives were established to overcome the problem of collateral provision which prohibits poor farmers from getting agricultural credit from formal credit institutions. In 1977, two cooperatives were established in the Um Ruwaba area and, for the first time, the Agricultural Bank of Sudan extended credit to 658 small farmers without collateral requirements (Ahmed, 1987). In 1987, the number of small farmers' cooperatives in the Um Ruwaba area reached 49 with about the same number in the El Obeid area (Technoserve Inc., 1987). Unfortunately, prior to the establishment of

these cooperatives there was no attempt made to educate the small farmers in the area to increase their awareness about cooperatives and the role that they can play in solving problems (Abdella, 1987). Furthermore, the role of these cooperatives was limited to provision of credit and some marketing services; there was no provision for other production inputs (improved seeds, fertilizers) and even the credit did not cover the farmers' total needs (Van Dooren and Kerkhoven, 1987). Therefore, these cooperatives were expected to make only a modest contribution to increasing the small farmers' agricultural production through the provision of some credit that enabled them to work on their farms, especially during critical times (sowing, weeding, and harvesting), instead of hiring themselves and their family labor to others (Technoserve Inc., 1987). Despite problems, the small farmers' cooperatives in northern Kordofan found much success in reaching the rural poor and in solving the traditional problems of lending to small farmers. Another clear success was the high credit repayment rate (almost 100%) until the 1984 drought (when it dropped to 2% although it recovered to 85% in 1986) (Van Dooren and Kerkhoven, 1987).

It is the purpose of this research to closely examine the success and failure of the small farmers' cooperatives in Um Ruwaba and to generate policy recommendations that could be adopted as a development strategy that would realize both growth and equity.

Theories of Development

Theories of development are categorized into two broad groups (Chilcote, 1984). The first includes theories that emphasize the positive accomplishments of capitalism; they are called diffusionist or evolutionist theories of development. The second includes theories that stress the negative consequences of capitalism and they are called theories of underdevelopment or critical theories.

The diffusionist theories of development

The evolutionist tradition of theorizing dates back to the early classical thinkers and founders of sociological theory. The general theme of this school of thought is that societies develop from simple, primitive forms to advanced, complex ones through a gradual and cumulative process of evolution. Prominent figures in this school include Comte, Spencer, and Durkheim. In his law of three stages, Comte argued that all societies develop at a cumulative rate from a "theological stage" to a "positive stage" passing through an intermediate, chaotic, and transitional "metaphysical stage" (Ashley and Orenstein, 1985).

For Spencer, it is through uniformitarianism (slow, step-by-step, cumulative, directional, progressive advance) that societies develop from simple, to compound, to doubly compound, to trebly compound societies (Ashley and Orenstein, 1985; Turner, 1985). Also, Durkheim argued that all societies will develop and progress in a natural,

normal, slow, and internally generated series of evolutionary changes from horde societies, which are characterized by a mechanical solidarity, to simple polysegmental, to polysegmental simple compound, to polysegmental doubly compound societies, which are characterized by organic solidarity (Ashley and Orenstein, 1985). Along this line of theorizing is also Tonnies' (Nelson, 1969) *gemeinschaft* versus *gesellschaft* classification. The evolutionary theories of development, namely modernization is based upon this heritage.

Modernization

The concept of modernization was discussed in length by Ibn Khaldun during the 14th century. He divided societies into "Badawa" (nomadism-ruralism) and "Hadara" (urbanism) (Baali, 1988). "Badawa" was characterized by simple and limited division of labor and specialization, the living conditions were less comfortable, there was a strong sense of solidarity (*Asabiyah*), people are more religious, there was little or no change in customs and habits, and illiteracy prevailed. "Hadara" was characterized by the opposite of these qualities. "Badawa" was expected to change to "Hadara" (Baali, 1988).

Today, the modernization paradigm is heavily influenced by Weber. In his classification of social actions, Weber indicated that there are value-rational actions in which individuals use rational means to achieve goals that are

defined in terms of subjectively meaningful values. Affective actions fuse means and ends together so they become emotional and impulsive. Finally, traditional actions are those in which the ends and means are fixed by customs and traditions, such as the strict rites of succession for groups and leaders in primitive societies (Ashley and Orenstein, 1985). In the Protestant Ethic and the Spirit of Capitalism, Weber (1958) argued that the development of capitalism can be best understood as part of the development of rationalism, and he believed that rationalization could be equated with modernization (Ashley and Orenstein, 1985).

Thus, for modernization theorists, capitalism offers a solution to the problem of backwardness and a path to development (Chilcote, 1984). Therefore, it should be promoted in the Third World. The classical form of the modernization paradigm is represented by Parsons' pattern variables: particularism - universalism, ascription - achievement, and diffuseness - specificity (Blomstrom and Hettne, 1984). According to Hozelitz (1960), who was the first to apply Parsons' pattern variables to the problem of development and underdevelopment (Blomstrom and Hettne, 1984), society goes through development or modernization as particularism, ascription, and diffuseness are replaced by universalism, achievement, and specification. Modern societies are characterized by application of knowledge to technology in the production of goods and services, use of ever-new and higher

forms of energy, and the goal of maximizing efficiency (Germani, 1981). Therefore, modernization is a total process affecting all the subsystems of the society (i.e., the political, social, and economic organizations) (Germani, 1981). Political modernization is identified with democratic-constitutional regimes and social modernization includes changes in the society at all levels: personality, norms, social relations, and institutions (Germani, 1981). But changes in the personality is considered the deriving force for modernization. It is argued that individuals in modern society, unlike their counterparts in the traditional society, acquire characteristics, such as faith in science and technology and beliefs in planning and calculability of the world, and they have more exposure to media (Hagen, 1962; Inkeles, 1966). Literacy is considered the most efficient method for modernization (Clark, 1982).

Economic modernization or development is best illustrated by Rostow's (1971) stages of economic growth, in which he argued that all societies pass through five stages in the process of modernization: the traditional-society stage, the pre-take-off stage, the take-off stage, the road-to-maturity stage, and, finally, the mass-consumption society. Each of these stages has certain specific characteristics (Blomstrom and Hettne, 1984; Rostow, 1971). In the traditional society, modern science and technology are either not available or not applied. Thus, it is characterized by very primitive and rudimentary technology

and very low labor productivity. The pre-take off stage is characterized by some technological improvement; labor productivity increases. In the take-off stage, most of the development problems were overcome and people develop a tendency to save; saving and investment increase from about 5% to at least 10% of the national income. Some sectors assume a leading role in the economy. In the road-to-maturity stage, technology is disseminated from the leading sectors to the rest of the economy and many new industries develop. Finally, the mass consumption stage is characterized by satisfaction of all basic needs and people start consumption of durable goods and services. Thus, from the modernization perspective, the state of underdevelopment is defined in terms of differences between developed and underdeveloped countries; development is intended to move a society through these stages (Blomstrom and Hettne, 1984).

Accordingly, underdevelopment or lack of modernization is considered the fault of the traditional underdeveloped societies due to their beliefs and values which represent obstacles to change and development. For the underdeveloped countries to develop, they have to be open and receptive to western culture and they should imitate those institutions that are characteristic of the west (Blomstrom and Hettne, 1984). Modernization scholars (e.g., Germani, 1981) acknowledged that modernization or development is never balanced and the many components of the sociocultural

structure do not initiate their transformation simultaneously nor proceed at the same speed. Furthermore, they acknowledged that at the geographical level there is some kind of imbalance between countries and within each country. Therefore, differentiation between a center and a periphery is an essential international as well as internal or national phenomenon (Germani, 1981).

The modernization paradigm has been subjected to much criticism. First of all, it was criticized for ignoring the influence of colonialism and imperialism on the less developed countries; in that sense, it was ahistorical in nature (i.e., no careful historical analysis is made in the less developed countries, which is contrary to what Weber demanded). Conceptually, there were many definitions and conceptions of modernization; there was no consensus about which one is important. Also, none gave a way to move from tradition to modernity. All were based on comparative statistics that neglect both the sources and route of change and they seemed to equate serialism with causal explanations (Blomstrom and Hettne, 1984). Ideologically, modernization suffered from an ethnocentric point of view; the values and terms used were those of western societies. Also, it reinforced the world's inequalities by requiring traditional societies to change themselves. Finally, modernization was criticized by the fact that modern institutions not always encourage people to be ambitious and the replacement of

kinship by formal institutions was not working as predicted.

Nevertheless, modernization theory has made significant contributions to the theory of development; the importance of planning, achievement orientation, and applying modern technology and efficient means in achieving more production (i.e., realizing the growth part of development) cannot be denied. Accordingly, and based on the modernization paradigm, the use of modern agricultural technology (e.g., chemicals, improved seeds) and education are considered important factors for increasing small farmers' production in this study.

Theories of underdevelopment

Most theories of underdevelopment have their roots in conflict theory. The various theories included in this category are based on the basic conflict assumption that power differentials assure that some groups exploit others, and conflict most frequently occurs over distribution of scarce resources (Turner, 1982).

Marx is considered the most influential figure in the conflict tradition. For Marx, the dominant characteristic of society was the continuous change of not only its elements but its structural form; this is an indicator of the presence of conflict as an essential feature of every society (Appelbaum, 1970). Furthermore, Marx considered conflict to be the driving force that brings progress and it

is the law that civilization has followed to the present day (Appelbaum, 1970). As indicated by Goss et al. (1980:85), "Marx's theory of historical change recognizes certain epochs in history...ancient, feudal, capitalist and communist. The history of all hitherto existing society is the history of class struggles...and the outcome of such conflict is the transcendence of one epoch by the next."

According to Marx, any society is based on economic foundations, which he called the mode of production (Bottomore and Rubel, 1956). The mode of production consists of productive forces and the social relations of production. Productive forces include labor power (workers) and means of production (e.g., tools, machinery, water power). The social relations of production involve the ownership of the means of production and the distribution of the material utilized in the society; these determine the form of exploitation of direct producers (laborers) by the owners of the means of production (Blomstrom and Hettne, 1984; de Janvry, 1981; Ashley and Orenstein, 1985). Marx argued that any type of production relation has certain forms of productive forces that is appropriate for it. Therefore, as the productive forces develop, the existing production relations become obsolete and inappropriate and new production relations will develop; this will occur through social revolution (Cottrell, 1984; Suchting, 1983). Marx argued that classes emerge where the production relations involve a division of labor that allows for

accumulation of surplus value by a minority group in an exploitative relationship to the mass producers (Goss et al., 1980). The position of the individual in the production process (labor or owner of the means of production) determines actions, ideas, and power (Barber, 1957). Therefore, conflict is not random; it is a product of the structure of society itself (Appelbaum, 1970).

In the capitalist mode of production, the capitalist class or bourgeoisie owns the means of production and monopolizes accumulation of capital by extraction of surplus value from wage-labor. For Marx, this is the essence of class exploitation (Ashley and Orenstein, 1984; Goss et al., 1980). Accordingly, the relationship between the capitalist class and the working class is one of dependency and conflict; within this conflict is the genesis for further social change (Goss et al., 1980). According to Marx, the mechanism through which this change occurs, as indicated by Appelbaum (1970:83), is:

- 1) In a capitalist society, classes tend to polarize increasingly: society breaks up into two hostile classes, the bourgeoisie and the proletariat. 2) As the classes polarize, their situations become increasingly extreme, with sections of the proletariat becoming increasingly pauperized and with society's wealth increasingly concentrated in the hands of a relatively few. 3) As the classes polarize, they become more homogeneous, internally, with other groupings absorbed into the two classes. 4) Once these processes reach their extreme, revolution terminates the existing arrangement and a new society emerges, with the formerly oppressed class in power.

Marx's theory has been critized on several grounds (Appelbaum, 1970). Empirically, Marx's theory proved to be weak since capitalist societies did not divide into two conflicting classes and instead many differentiations had happened resulting in a continuum of classes. Also, Marx could not foresee the possibility of separation between the ownership of the means of production and the technical expertise and control of the means of production; hence, he failed to assess the effects of social mobility (Appelbaum, 1970). Dahrendrof critized Marx for limiting the resolution of class conflict to violent upheaval. Finally, Marx's one-dimensional treatment (related only to the property possession) of class was questioned.

The theories of underdevelopment include perspectives such as dependency, internal colonialism, center-periphery, and the world system. These perspectives look to the process of development and underdevelopment as two faces of the same coin; for them it is impossible to comprehend one without taking into consideration the other. Therefore, all of them lead to one or both of two dichotomies (Chilcote, 1984). The first is the division of the world into developed, industrialized, advanced countries and underdeveloped, poor, dependent countries. The second dichotomy is the polarization within countries into advanced, modern groups and regions and backward, primitive ones. All underdevelopment theories see the cause of underdevelopment in the incorporation of Third-World

countries into the world capitalist system and, in particular, in the uneven, exploitative relationship between the parties in the two dichotomies. They differ only on the emphasis placed on the importance of the relationship in each dichotomy and the perceived solutions (Blankson, 1987).

For example, according to Wallerstein's world capitalist system thesis, "...the world economy is based upon a geographically differentiated division of labor, featuring three main zones--core, semi-periphery, and periphery--tied together by the world market trade" (Skocpol, 1977:1077) which differentially rewarded each zone, with the surplus flowing disproportionately to the core areas. Similarly, Prebisch's center-periphery paradigm divided the world into center and periphery societies; it is the deteriorating and unfair terms of trade in the periphery that impeded its development (Chilcote, 1984). Based on his examination to the situation in Mexico, Casanova argued that an internal colonialism similar to the colonial relationship between nations is evident in that country (Chilcote, 1984). In this relationship, certain regions, classes, and groups are exploited by and dependent on other groups; this is the cause of underdevelopment. This thesis is used by development scholars to explain the underdevelopment of rural areas that is believed to be caused by urban-biased policies and the exploitation of the rural areas by the urban centers (Buttel and Newby, 1980). This perspective was used to explain Appalachian underdevelopment and

to study the relationship between the English core and the fringe of Scotland and Ireland (Buttel and Newby, 1980).

Dependency theory

Dependency theory is the underdevelopment perspective that is used in this study; therefore, it will be examined in more depth. It originated with Latin American and other Third-World scholars, particularly the United Nations Economic Commissions to Latin America (ECLA) (Blomstrom and Hettne, 1984). Their comments were based on an analyses of imperialism that viewed the problem of underdevelopment in the Third World as stemming from its incorporation in the international division of labor as producer of agricultural and other raw materials and its exploitation by developed countries (Doran et al., 1983).

Consequently, dependency theorists argue that although the domestic and institutional features of any nation might be important, they are not the key factors accounting for the development or underdevelopment of that nation. Rather, the key factor is the position of that nation or country in the world capitalist system (Valenzuela and Valenzuela, 1981). Accordingly, the world is divided into core, industrialized, developed countries and peripheral, poor, underdeveloped countries. Also, center countries are viewed as capable of dynamic development responsive to their internal needs; they are the main beneficiary of the global

links. On the other hand, peripheral countries are seen as having a reflex or dependent development that is constrained by their incorporation into the world capitalist system. According to dependency theory, underdeveloped countries are in a very weak bargaining position with the developed countries; this is mainly due to the fact that the peripheral countries produce and supply few products, most of which are raw materials. They have few markets for these products, while the center countries produce a wide range of highly processed commodities that can be sold anywhere and they can get the raw material from different sources (Valenzuela and Valenzuela, 1981). Furthermore, this polarization is brought to the underdeveloped countries themselves when the core countries and multinational corporations form an alliance with peripheral states and "narrow elites," who benefited from the underdevelopment of their countries, to promote economic growth and development of a modern sector at the expense of the traditional sector. This exacerbates inequality within the peripheral countries (Doran et al., 1983; Valenzuela and Valenzuela, 1981).

There are different theoretical positions within the dependency school, particularly regarding the solution for underdevelopment problems (Blomstrom and Hettne, 1984). In Latin America, the solution for underdevelopment was seen in import-substitution industrialization, which aims at substituting a large part of current imports by domestic production (Blomstrom and Hettne, 1984). This is to be

achieved through protecting domestic industries until their competitive ability improves, restricting imports through tariffs and taxes, exporting raw materials with the resulting revenue used to import capital goods needed for domestic industry, and building foreign business and investment, especially at the beginning, to help in the process of technology and capital accumulation, with the government playing an active role in the process as a regulator and coordinator.

In the Caribbean, the solution was seen in industrialization by invitation, which is export-oriented. In Africa, the solution was seen in the connection between consumption and capital-goods sectors to create a self-sustaining capitalist development (Blomstrom and Hettne, 1984).

There are some arguments that are common to the majority of dependency proponents. First, underdevelopment is closely connected with the expansion of the industrialized capitalist countries, which leads them to extract resources from and to find markets in the underdeveloped countries. Second, development and underdevelopment are different aspects of the same universal process, where development in the center is accompanied by and based on underdevelopment in the periphery. Third, underdevelopment cannot be considered as the original condition in an evolutionary process; it resulted from the incorporation of the underdeveloped countries into the world

capitalist system. And, fourth, dependency is not only an external phenomenon but is also manifested in different ways in the internal structure of the underdeveloped countries (Blomstrom and Hettne, 1984; Chilcote, 1984).

The metropolis-satellite perspective

Among the different variants of dependency theory, it is Frank's metropolis-satellite perspective (Blomstrom and Hettne, 1984) that will be used in this study. Like the other dependency theorists, Frank considered the main cause of underdevelopment in the Third-World countries to be their incorporation in the world capitalist system. He argued that the world capitalist system is characterized by a metropolis-satellite structure in which the metropolis exploits and extracts economic surplus from the satellite (Blomstrom and Hettne, 1984). According to this perspective, the exploitation starts at the bottom of the structure where the small farmers and laborers (satellite) are exploited by the large farmers, village traders, and local money lenders, who at this stage act as metropolis (Blomstrom and Hettne, 1984; Chilcote, 1984). Some of the economic surplus of the large farmers and village traders is extracted by traders and money lenders at the regional level which is considered to be the metropolis. Thus, the economic surplus flows upward in the system in a chain-like fashion until it eventually reaches the world metropolis (Figure 1) (Blomstrom and Hettne, 1984). At each step along

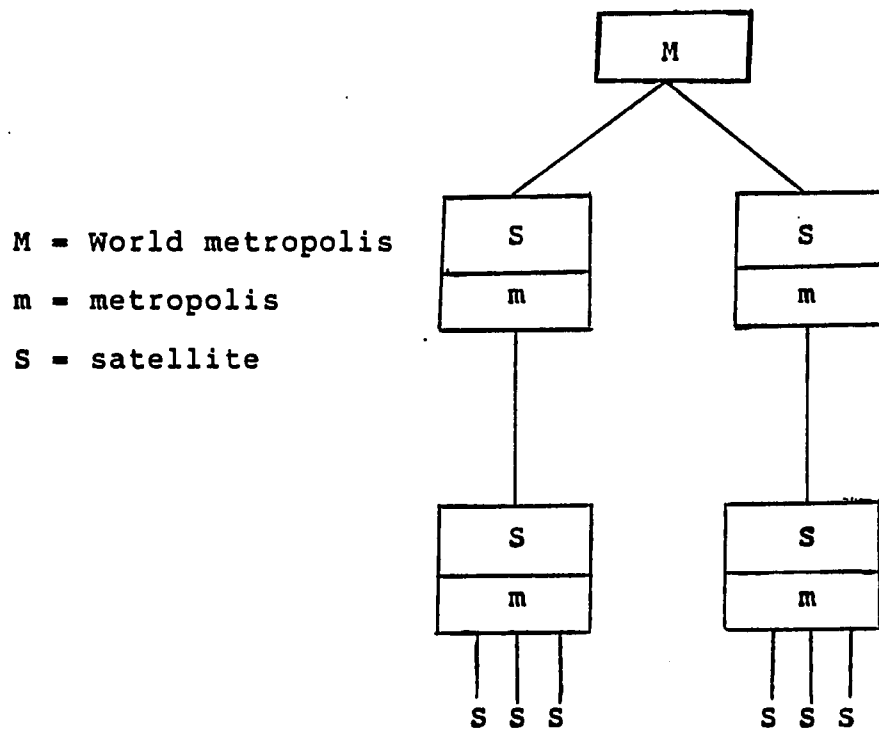


Figure 1. Frank's Metropolis-Satellite model

the way, the relatively few capitalists exploit and expropriate some or all of the economic surplus of the many below them; in this way, the international, national and local capitalist system generates economic development for the few and underdevelopment for the many simultaneously (Chilcote, 1984; Blomstrom and Hettne, 1984).

Like other theories, many criticisms have been raised against dependency theory. One of these concerns its tendency to focus on the exchange sphere and neglect the production sphere (Buttel and Newby, 1980). According to the Marxists, the dependency theorists were at fault when they considered the cause of underdevelopment in the peripheral countries to be their contact with the core countries as producers and exporters of primary products, instead of the real cause, which is the class structure in the peripheral countries themselves (Blomstrom and Hettne, 1984). This criticism was proved to be empirically true by the fact that many of the now developed countries (e.g., South Korea, Taiwan) had played the role of raw materials producer and exporter at some time in the past, but since their class structure is different they were able to develop (Doran et al., 1983). Another criticism pointed against dependency theory is the lack of a causal relationship between the characteristics of the underdeveloped countries and underdevelopment. Again, this was proved empirically since countries such as Canada and Belgium are more "dependent" on foreign investment than most of the

underdeveloped countries (Blomstrom and Hettne, 1984). Another criticism of dependency theory is that technological dependence does not always exclude and prohibit the generation of domestic technology; indeed, countries such as Argentina even managed to export technology (Blomstrom and Hettne, 1984).

The relevance of the metropolis-satellite variant of the dependency theory to this study lies in its explanation to the problem of small and traditional farmers. According to this theory, the main cause of the underdevelopment in the traditional subsector of small farmers is the exploitative relationship by which they are connected to local and hence the national and international capitalist system. The small farmers, according to this theory, represent the ultimate satellite from which the economic surplus extraction starts; they act as metropolis in the chain to no one. According to this theory, the importance of cooperatives come from their ability to strengthen small farmers' bargaining power and to break the unfair and exploitative relationship that connects them with the local money lenders and village traders.

Theoretical Synthesis

Problems of rural communities, and small farmers in particular, are caused by two main factors (Wilkinson, 1986). The first one concerns isolation from the rest of the country. As a consequence to this isolation, small

farmers do not have access to information about new and improved technology and, accordingly, they are always at the bottom of the modernization continuum. The second factor is the exploitative and uneven relationship that connects small farmers with other groups, such as money lenders, village traders, or even the urban centers (Blankson, 1987; Harbeson, 1985).

Therefore, to fully understand and explain the problems of small farmers and rural areas, a theoretical model is needed that incorporates variables that make modernization difficult as well as variables that lead to the exploitation of small farmers by other groups. The need for more than one theory to explain small farmers' problem is recognized by many scholars. Vandergeest and Buttel (1988) called for "a contemporary neo-Weberianism," which is a blending of a Weberian theory with concepts and insights from the Marxist tradition, instead of either the single causal formulation of the dependency theory or the traditional-modernity continuum of the modernization perspective. Also, Blankson (1987) argued that neither modernization nor dependency theory can alone explain the problem in a satisfactory manner; at best, each of them represents half the truth. He called for an analytical framework that ties together the various factors and moves away from the single-issue theories. Therefore, in this study, both the modernization and dependency perspectives are used to derive the concepts

and variables that constitute the components of the analytical model that is to be used.

According to the metropolis-satellite theory, the main cause of the small farmers' underdevelopment is to be found in their relationship with other groups who act as metropolis and exploit and extract economic surplus from them. The small farmers are exploited and economic surplus is extracted from them in different ways. One of these is borrowing from informal sources of credit. Such borrowing is characterized by payment of very high interest rates (Gregg and Ahmed, 1983). This excessive interest-bearing capital is distinguished by Marx as usurer's capital and, as cited by Mooney (1983:570), Marx indicated that "usurer's capital may absorb not only the entire profit but even a portion of the wage that the simple commodity producer 'pays himself'." Also, Kautsky equated indebtedness and interest with payment of land rent and indicated that both play a role in the proletarianization process of small farmers without complete expropriation (Banaji, 1980). Also, Lenin "retains both the conception of equivalence of rent and interest and of the debtor as undergoing the historically necessary process of proletarianization" (Mooney, 1983:571). Stinchcombe (1961) also indicated that interest payment represents an economic surplus extraction as does the rent payment. Thus, interest payment and indebtedness, particularly to informal sources of credit, represent one way through which economic surplus

is extracted from small farmers (satellite) by local money lenders (metropolis).

Another way through which village traders and local money lenders (metropolis) extract economic surplus from small farmers (satellite) is the "sheil system," which is better known as contract production, where a specified quantity of product is exchanged for a predetermined price (Mooney, 1983). In Sudan, several types of "sheil" are practiced, but the dominant one is an advance by the local moneylenders (in cash or kind) to a grower who pledges to deliver to the lender a specific amount of crop at harvest time. A survey conducted by the Agricultural Bank of Sudan indicated that in 1978-79, 50% of the farmers in Western Sudan received credit through the "sheil" system and obtained only 50% of the market price for their crops (i.e., the local moneylenders gave them only 50% of the market price) (Gregg and Ahmed, 1983). Davis (1980) used Marx's analysis of piece work as a base for his study of contract production. In his analysis, Marx indicated that "wages by the piece are nothing else than a converted form of wages by time" (Mooney, 1983:573). Based on this, Davis (1980) concluded that contract production represents an appropriation of surplus value from the agricultural producers in which the product, instead of piece work, becomes the vehicle in which surplus value is transferred. By the same token, when small farmers sell their product to the village traders at a

low price, then a surplus value is extracted from them; this is the essence of the metropolis-satellite thesis.

Off-farm work is another important means through which surplus value is extracted from small farmers and laborers in general and which leads automatically to their proletarianization (Steeves, 1972). Mooney (1983) agreed that off-farm work represents proletarianization but at the same time he argued that it might also be a means for small farmers to avoid debt, tenancy, or contractual production. In this study, it is the off-farm work as agricultural labor during the agricultural season that is considered to clearly represent an appropriation of surplus value from small farmers; it has negative effects on their own agricultural production (Raynaut, 1980). The small farmers' cooperatives in Northern Kordofan province provide small farmers with credit so that they can work on their farms instead of working as laborers on others' farms; if they have abundant family labor, they can increase their farm size since land is not in shortage in this area (Technoserve Inc., 1987).

In conclusion, the small farmers' cooperatives are expected to release the farmers from the different forms of exploitation by others and help them retain a large share of their own production by eliminating middlemen through provision of marketing services as well as credit without high interest rates (Opio-Odongo, 1980; Stinchcombe, 1961).

On the other hand, and according to the modernization paradigm, for the traditional agricultural sector to develop and small farmers to increase their agricultural production, modern agricultural inputs have to be used and improved methods of farming have to be adopted (Germani, 1981). One way to achieve this is to provide small and traditional farmers with education, such as that available through an extension service, that teaches them about the importance of modern inputs and how to use them as well as about improved farming techniques (e.g., proper sowing date, spacing between plants, planting in rows to ease weeding and harvesting) (Gregg and Ahmed, 1983).

In addition to releasing small farmers from different forms of exploitation, the agricultural cooperatives are expected to provide the poor farmers, who cannot make it on their own, with extension services and modern agricultural inputs at affordable prices (Okafor, 1982; Hamid, 1982; Mishra, 1982; Cernea, 1977). The ultimate goal of both counteracting small farmers' exploitation by others and modernizing their agriculture is to increase their agricultural production and income and, consequently, to improve their living conditions. All these relationships can be envisioned as a causal chain as presented in Figure 2.

Theoretical hypotheses

The first hypothesis is derived from the officially-stated purpose of the small farmers' cooperatives in Western Sudan. These cooperatives were established to serve small, poor farmers, and specifically, to overcome the problem of lack of collateral that inhibits poor farmers from getting credit and other services from formal sources and development agencies (Technoserve Inc., 1987; Gregg and Ahmed, 1983). They did not involve pooling of land or labor. The only requirement for membership, in addition to being a farmer in the area, was the payment of a membership fee of L.S. 10 (2 U.S. dollars). This fee was thought to be low enough that every farmer can pay. Therefore, it is hypothesized that the household's cooperative membership does not depend on its socioeconomic status.

The fact that the relatively rich, educated, and "progressive" farmers are the ones who benefit from extension service and most development programs is heavily documented in the literature (Brown, 1981; Chambers, 1983; Rogers, 1983; Garrett, 1984; Gartrell and Gartrell, 1985). Consequently, they are able to use modern agricultural inputs and improved farming practices, thus increasing their agricultural production and improving their living conditions. Also, the fact that poor farmers are the ones who are subjected to different forms of exploitation is well established (Raynaut, 1980; Blomstrom and Hettne, 1984).

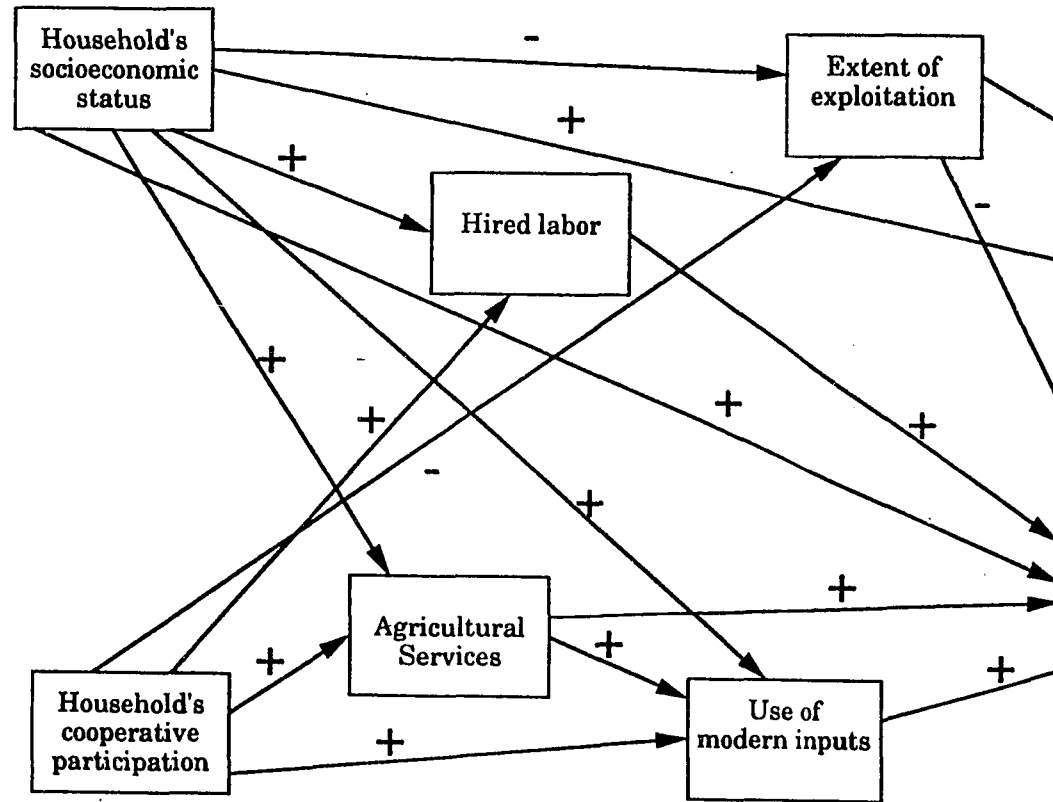
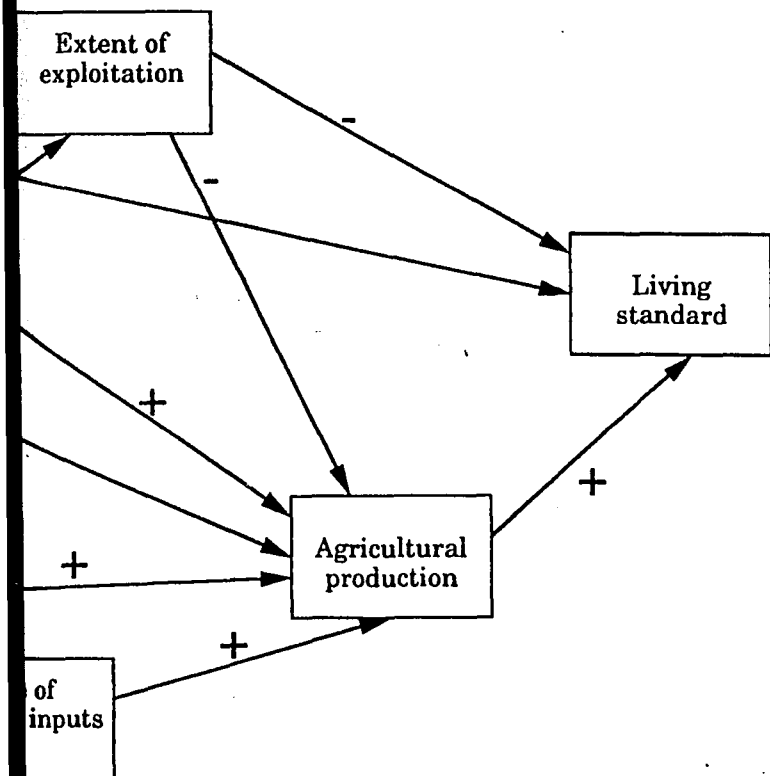


Figure 2. Analytical model and principal hypothesized relationships



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Therefore, it is hypothesized that the farm household's socioeconomic status reduces the extent of exploitation to which it is subjected, and positively affects the agricultural services received, the agricultural inputs used, the agricultural production realized, and the conditions under which the family lives.

Cooperatives are used in many countries as a means to save small farmers from different forms of exploitation, increase their agricultural production through provision of agricultural inputs and services, and, consequently, improve their living conditions (Hussain, 1973; Ellman, 1977; Mensah, 1977; Harbeson, 1985; Stewart, 1984). Thus, it is hypothesized that the household's cooperative involvement has positive effects on its agricultural income and, hence, on its living conditions.

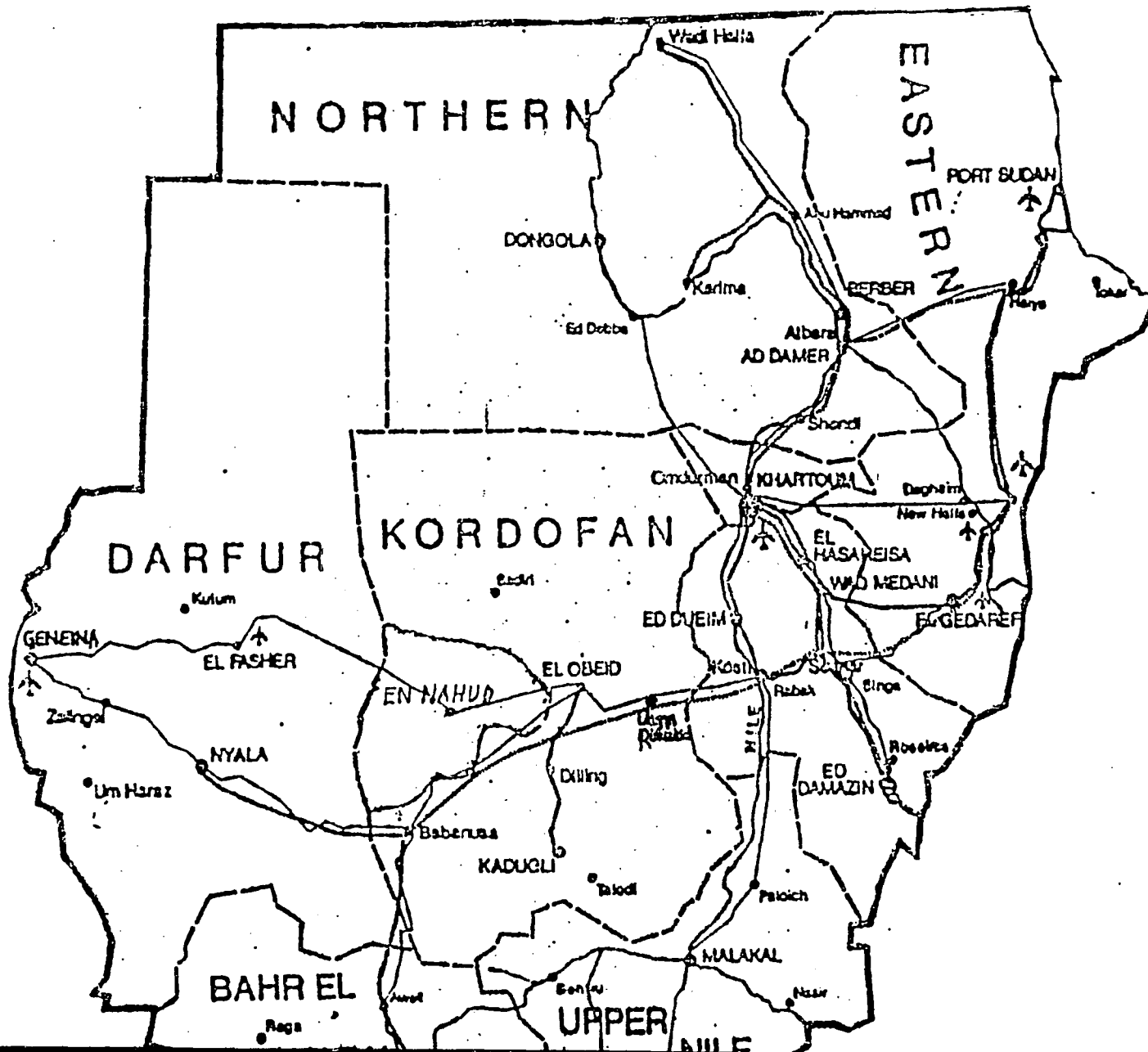
CHAPTER III. METHODS AND PROCEDURES

This chapter is divided into five sections. In the first, the geographic area of the study is described. The second section deals with sampling procedures and data collection. In the third section, the variables under consideration are operationalized and the hypotheses to be tested are stated. The fourth section includes a discussion of the statistical techniques that are used to analyze the data. Finally, the practical problems encountered during the survey concludes the chapter.

The Study Area

This study was conducted in the area around the town of Um Rawaba in Northern Kordofan Province (Figures 3 and 4). This area is characterized by an average rainfall of about 400 millimeters falling during the period from June to October and reaching its maximum during July and August, light sandy soils and a population of 230,000, according to the 1973 census. Residents are 91% rural, 6% urban, and 3% nomad with the Jwamah tribe dominating other small tribes like El Buzaga, El Habania, El Ja'alean, and El Falata (Ahmed, 1987; Abdella, 1987). The rural people live in villages that vary in size from five to about 150 households. The average household size is eight persons; it ranges from one to twenty persons. The population in the

villages varies according to the season; greatest during the rainy season and lowest during the dry season (Reeves and Frankenberger, 1982). Agriculture is the main economic activity. Each household cultivates on average a total area of 18 mukhamas (1 mukhamas = 1.8 acres). Sesame is considered the main cash crop in addition to "karkadi" (sorrel), watermelon seeds, and groundnuts in the northern part of the area. Forty-eight percent of the cultivated land is usually grown with sesame (Reeves and Frankenberger, 1982). Sorghum and millet are the main food crops. Farmers on average earn an agricultural income of L.S. 1642 per year; this ranges from L.S. 200 to L.S. 9684. Nearly every household supplements its agricultural income through off-farm activities. This includes dry-season migration to cities and irrigated agricultural schemes, charcoal manufacturing, water hauling and carpentry. Those who migrate usually leave the village in late December or early January, after the harvesting season, and return back in May to start cleaning their fields for the next agricultural season (Reeves and Frankenberger, 1982). Although the land is officially considered government property according to the 1970 Unregistered Land Act, the residents considered it a tribe property with the individuals having cultivation and



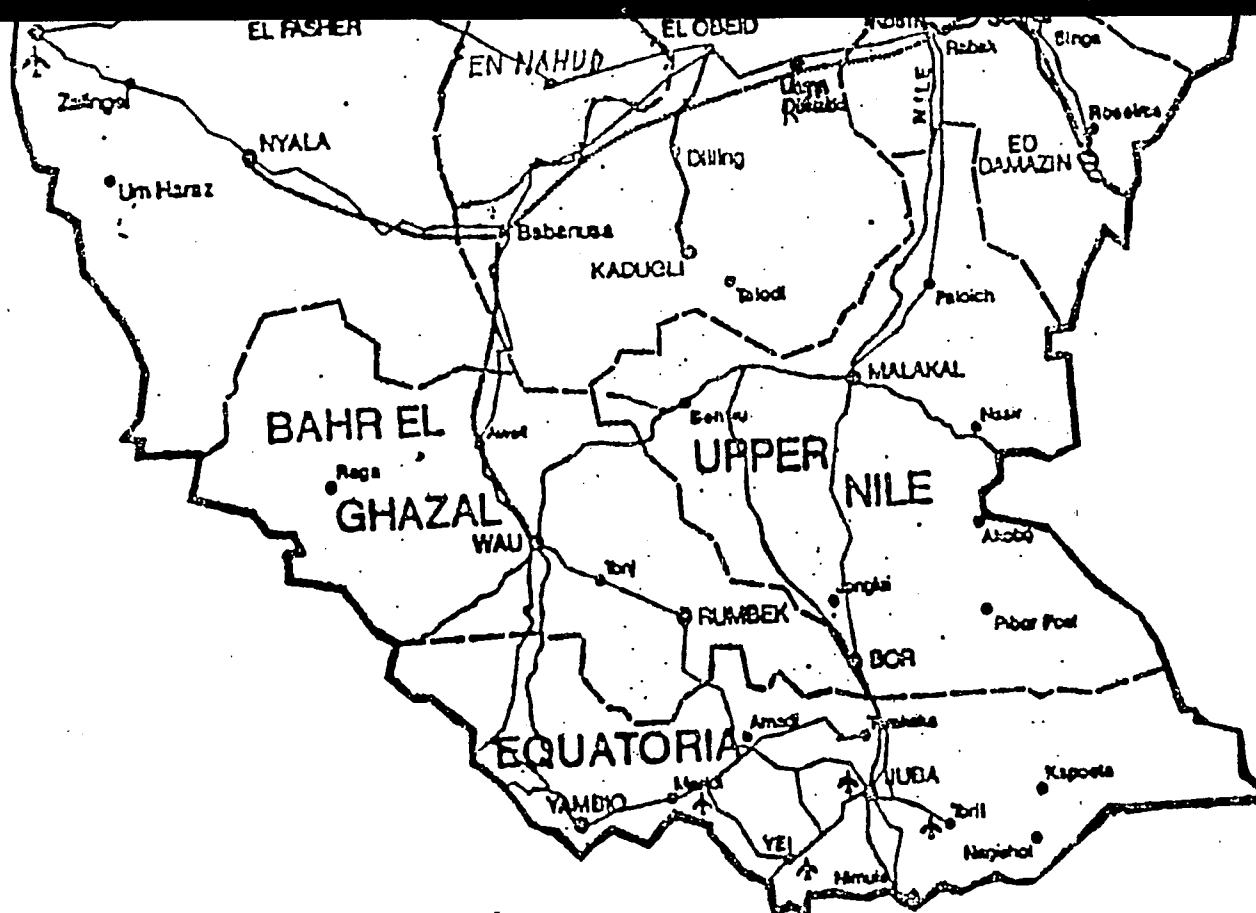
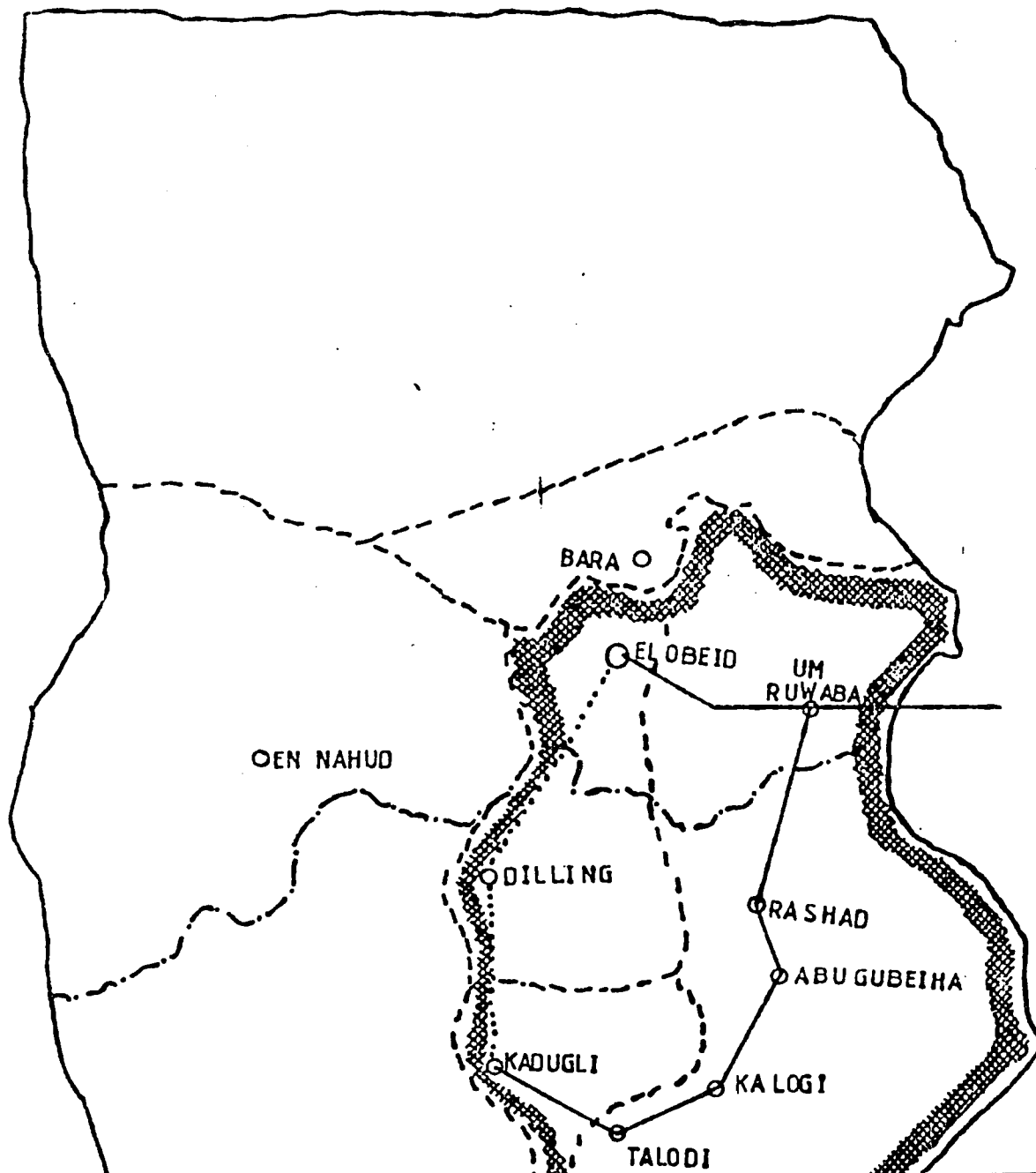


Figure 3. Sudan



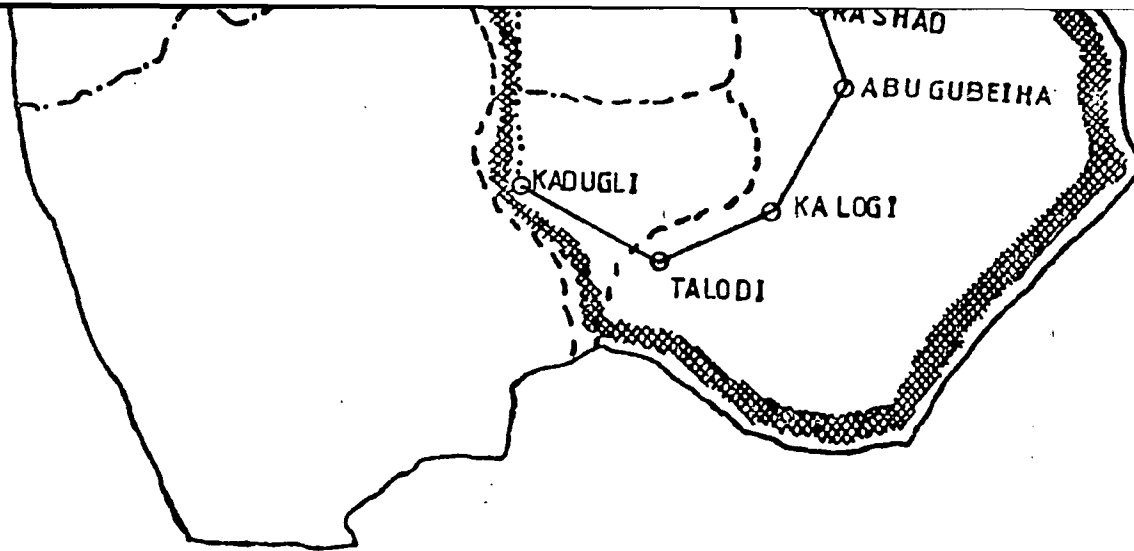


Figure 4. The small farmers' cooperatives project area

grazing rights (Ahmed, 1987; Technoserve Inc., 1987).

Sampling Procedures and Data Collection

The sample used in this study was drawn in two stages. The first step was the selection of villages and cooperatives to be included in the study and the second step was the selection of the individual households from which the data were to be gathered. At the first stage, a sampling frame was established by getting a complete list of all agricultural cooperatives in the Um Rawaba district from the Agricultural Bank of Sudan, Um Rawaba branch. This list included 49 villages, each of which had an agricultural cooperative. In each village, there were approximately 50 to 80 cooperative farmers and about 15 to 25 noncooperative farmers. From this population of villages, 14 cooperatives were randomly selected. To have a more representative sample of all farmers in the area, another sampling frame of villages in the Um Rawaba district in which there were no agricultural cooperatives was established. A list of these villages was obtained from the Council of Rural Areas in Um Rawaba. Two villages were selected randomly from the population of 12 villages that had no agricultural cooperatives. Thus, a stratified, random sample of 16 villages was selected to represent the district.

Then, a list of members was obtained for each of the 14 selected cooperatives from the Agricultural Bank of Sudan, Um Rawaba branch; 10 farmers were randomly selected from the population of each cooperative for a total of 140. Establishing the sampling frame for farmers who were not members of cooperatives was more difficult. First, efforts were made to get a list of farmers in the 16 selected villages from government departments, such as the Agricultural Bank of Sudan, the Council for Rural Areas, the local Office of Agriculture in Um Rawaba; but this was not successful. After that, a trip was made to each of the 16 villages and a list of the names of household heads was obtained from each village council. By excluding from these lists the names of farmers who were members of cooperatives, a list of those who were not members was established for each village.

Later it was discovered that the lists obtained from the villages were inflated for the purpose of securing more of the commodities that are provided through rationing and other programs. After a lengthy explanation of the study, its purpose, and importance to the researcher, and with the help of another interviewer from the same area, a more accurate list of farmers not belonging to cooperatives was obtained from village councils and leaders. Then a random sample of three farmers who were not members was selected from each of the 14 villages in which there were cooperatives. A random sample of nine farmers was selected

from each of the two villages in which there was no cooperative. A total of 60 farmers who were not members of cooperatives were selected for study.

Thus, a random sample of 200 farmers was selected. Data were collected through face-to-face interviews with 183 farmers. Two of the remaining 17 farmers refused to be interviewed. Both of these were farmers who were not cooperative members but in villages that had agricultural cooperatives. The remaining 15 farmers were not available in their villages at the time of the study. The heads of the households were the ones who were interviewed; in their absence, the oldest male present was interviewed.

The data were collected through face-to-face interviews by two interviewers. One of them was a final year student in the University of Khartoum, and he is a citizen of the study area. The other was a graduate student at Iowa State University.

The survey instrument was developed under the supervision of the members of the program of study (POS) in English; then it was translated to Arabic and pretested in part of the White Nile province neighboring the study area. After the pretest, some changes were made and the final form of the survey instrument was established. At the coding stage, the data were translated back to English.

Measurement of Theoretical Concepts

Measurement is one of the issues that requires close attention in sociological research (Stokes and Miller, 1985). In this study, previous research was used to guide the measurement of the different concepts whenever possible. Since both contingency tables and path analysis were used to analyze the data, most of the variables were used in both uncollapsed and collapsed (categories) forms.

Socioeconomic status

Socioeconomic status is one of two exogenous variables that are hypothesized to influence directly and indirectly the household's agricultural income and living conditions. The multidimensional nature of socioeconomic status of a household is stressed in the literature (Gartrell et al., 1973). Accordingly, researchers have used several indicators of socioeconomic status depending on the study area. These include household annual income, level of living, formal education, land ownership, and possession of durable goods (e.g., power washer, automobile) (Gartrell et al., 1973; Haller and Saraiva, 1972; Hansen and Haller, 1973).

In this study, the socioeconomic status of a household is measured by two scales. The first indicates the economic position of the household and is composed of the total off-farm income other than work as an agricultural laborer. It has a range of L.S. 9300, a mean of L.S. 990.6, and a

standard deviation of 1050.7. The second scale indicates the social participation and standing of the household; and it is a composite of five variables. These variables are number of radios owned by the household's members, household head's formal education, the household head's number of wives, number of organization committees the household's members served on in the past five years, and the number of dispute settlements participated in. Factor analysis was used to estimate the contribution of each of the five variables to the social participation and standing scale. The social participation and standing scale score equals 0.56 times the household head's formal education (in school years completed) plus 0.50 times the number of wives plus 0.74 times the number of organization committees served on plus 0.66 times the number of dispute settlements participated in plus 0.67 times the number of radios in the household. It has a range of 11.57, a mean of 1.99, and a standard deviation of 2.26.

Cooperative participation

Cooperative participation is the second exogenous variable that is proposed to affect the household's agricultural income and, hence, its living conditions through several intervening variables. Researchers have used membership in a cooperative, holding an executive or administrative position in the cooperative, attendance at

cooperative meetings, and membership on executive committees of cooperatives as measures of the household or farmer's cooperative participation (Nadarajah, 1982; Slamet, 1984; Hay, 1948). In this study, an index that ranges from zero to two was formed to measure cooperative participation. If there was no one in the household who was a member in the village agricultural cooperative, then the cooperative participation index of that household was zero. If one of the household's members was a cooperative member but this person never served on the cooperative executive committee, then the cooperative participation index of that household was one. And, if there was someone in the household who was a member of the village agricultural cooperative and served or was serving on the cooperative's executive committee, then the cooperative participation index of that household was two. A total of 27.3%, 55.2%, and 27.9% of the households in the sample had a cooperative participation indexes of zero, one, and two, respectively.

Extent of exploitation

Extent of exploitation is one of the important variables that may prevent small farmers from realizing the full potential of their agricultural production. It determines how much economic surplus is extracted from small

farmers. Therefore, one way through which cooperatives are expected to help small farmers is to reduce the extent of exploitation to which they are subjected. Researchers have used indebtedness, payment of excessive interest rates, working as a laborer for others, and engaging in contract production as indicators of exploitation and proletarianization (Mooney, 1983; Davis, 1980; Heffernan, 1972). In this study, the extent of exploitation was measured by three variables. One of these variables was the amount of interest rate paid for loans borrowed in the 1987-1988 agricultural season. The interest rate paid varied according to the source of loan, with loans from local moneylenders and village traders representing the most expensive loans. The interest rate paid ranges from zero to 100%; it has a mean of 24, and a standard deviation of 14.93. A second measure was the number of days the household's members worked as agricultural laborers for others in the 1987-1988 agricultural season. It ranges from zero to 180 days, has a mean of 23.6, and a standard deviation of 33.62. Finally, the amount of crop sold under the "sheil" system in 1987-1988 was included. It ranges from zero to two sacks; has a mean of 0.077, and a standard deviation of 0.355; collapsed: did not sell any crop under "sheil" system, sold some crop through the "sheil" system.

Agricultural services received by the household

The agricultural services a household receives are considered crucial to the modernization of its agriculture and it is one of the contributions that the cooperatives are expected to make to solve the small farmers' problems. It was measured by two variables: the number of extension agent visits and the amount of sesame marketed in the area main market in 1987-1988. The extension agent's visits range from zero to eight, have a mean of 0.76, and standard deviation of 1.08. The amount of sesame marketed in the main market ranges from zero to 60 Kontars (1 Kontars = 100 Ib), has a mean of 5.5, and standard deviation of 7.8.

Hired labor

Hired labor is one of the variables through which the household's socioeconomic status is expected to improve the household's agricultural income. Although the credit offered by the cooperative was expected to help the small farmers to work on their farms and stop working as agricultural laborers for others, the possibility that the relatively rich farmers might use it to hire labor is not excluded. Therefore, hired labor might also be an intervening variable through which cooperatives could increase the farmers' agricultural income. It was measured

by the amount of money spent on hiring labor in the 1987-1988 agricultural season. It ranges from zero to L.S. 2050, has a mean of 143.55, and a standard deviation of 316.8.

Use of modern inputs

Use of modern agricultural inputs is an indicator of the extent of agricultural modernization. As argued by the proponents of the modernization perspective, it is important for agricultural growth and development. This was measured by the amount of pesticides used in the 1987-1988 agricultural season. It ranges from zero to 18 ounces, has a mean of 1.3, and a standard deviation of 2.42.

Agricultural income

Agricultural income is one of the key variables. The main task of this study is to discover the determinants of the small farmers' agricultural income and to develop policy recommendations that will bring them into effect. Agricultural income was measured by the total value of all crops grown in 1987-1988. The value of food crops which are used for household consumption was estimated using the prices prevailing during the time of the survey. It ranges from L.S. 200 to L.S. 9684, has a mean of L.S. 1642, and a standard deviation of 1375.4.

Living standard

Living standard is the ultimate dependent variable under consideration in this study. The overall objective of this study is to develop policy recommendations that might improve the living conditions of the small farmers. An expenditure index consisting of per capita expenditure on food, education, health care, and house improvement was created (Gartrell et al., 1973). It ranges from 46.5 to L.S. 1460, has a mean of 215.43, a standard deviation of 135.95.

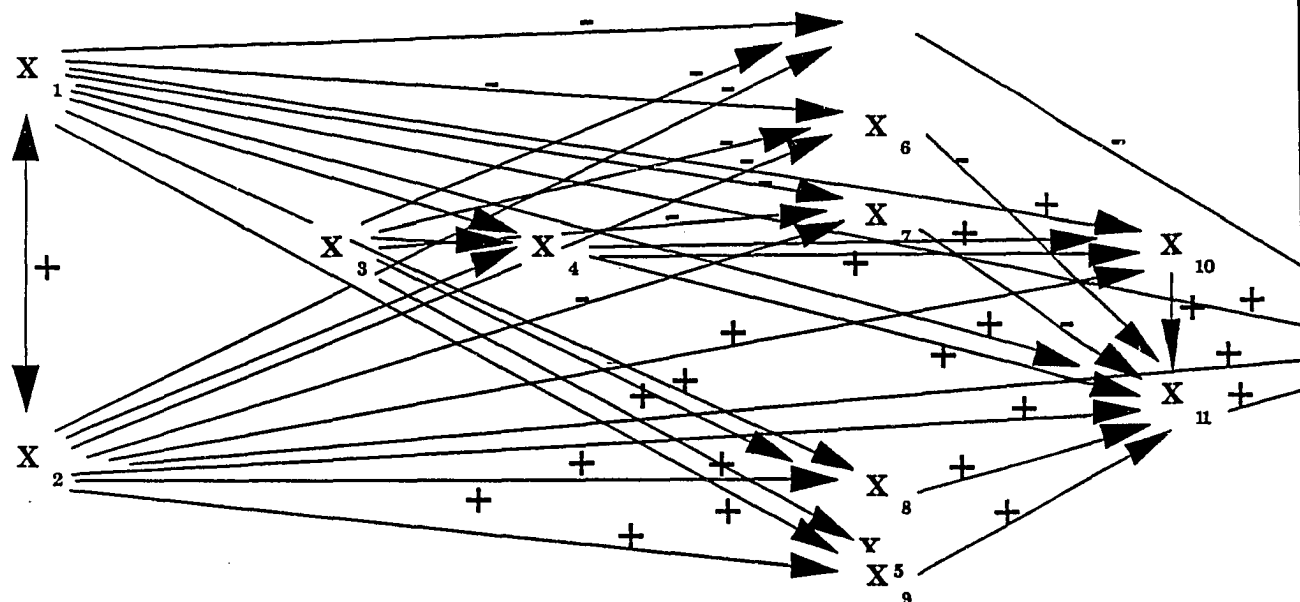
Operational hypotheses

1. The household's cooperative membership does not depend on its socioeconomic status.
 - 1.1. The household's cooperative participation index does not depend on its off-farm annual income or on its social participation and standing.
2. The household's socioeconomic status has direct and indirect effects on its agricultural income and living conditions.
 - 2.1. The higher the household's off-farm income, the higher the number of extension agent visits it received, the higher the amount of money it spends on hiring labor, the less interest rate it pays on loans it borrows, the less the number of days the household's members work as agricultural laborers for others, the less amount

of crops it sells under the "sheil" system, the higher amount of pesticides it uses, the higher its agricultural income, and the higher its expenditure index.

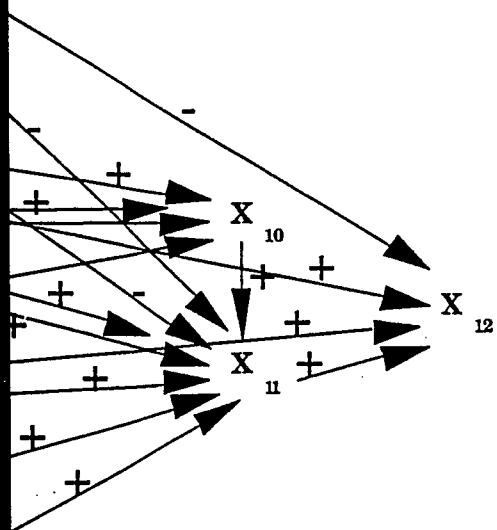
- 2.2. The higher the household's social participation and standing, the higher the number of extension agent visits it receives, the higher the amount of money it spends on hiring labor, the less the interest rate it pays for loans it borrows, the less the amount of crops it sells under the "sheil" system, the less the number of days its members work as agricultural laborers for others, the higher the amount of pesticides it uses, the higher its agricultural income, and the higher its per capita expenditure index.
 3. The household's cooperative participation has an indirect effect on its agricultural income and on its living conditions.
 - 3.1. The higher the household's cooperative participation index the higher the number of extension agent visits it receives, the higher the amount of money it spends on hiring labor, the higher the amount of crops it sells through the cooperative, the less the number of days it's members work as agricultural laborers for others, the less the interest rate it pays on loans it borrows, the less amount of crop it sells under the "sheil" system, the higher the amount of pesticides it uses, and the higher its agricultural income.
-

4. Hypotheses involving intervening variables:
 - 4.1. The higher the number of extension agent visits the household receives, the higher the pesticides it uses, the higher the amount of sesame it sold in the area main market, and the higher its agricultural income.
 - 4.2. The higher the amount of crop the household markets through cooperatives, the higher its agricultural income.
 - 4.3. The higher the amount of money the household spends on hiring labor, the higher its agricultural income.
 - 4.4. The higher the amount of crops the household sells under the "Sheil" system, the less its agricultural income.
 - 4.5. The higher the interest rate the household pays, the lower its living expenditure index.
 - 4.6. The higher the number of days the household's members work as agricultural laborers for others, the less its agricultural income.
 - 4.7. The higher the amount of pesticides the household uses, the higher its agricultural income.
 - 4.8. The higher the household's agricultural income, the higher its per capita living expenditure index.



- | | |
|-----------------|--|
| X ₁ | Household's economic index |
| X ₂ | Household's social standing index |
| X ₃ | Household's cooperative participation index |
| X ₄ | Number of extension agent visits |
| X ₅ | Interest rate paid |
| X ₆ | Amount of crop sold through "sheil" |
| X ₇ | Number of days worked as agricultural laborer for others |
| X ₈ | Amount of crop sold in the main market |
| X ₉ | Amount of hired labor |
| X ₁₀ | Amount of pesticides used |
| X ₁₁ | Agricultural income |
| X ₁₂ | Household per capita living expenditures |

Figure 5. Operationalized analytical model



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Statistical Techniques and Methods

In this section, the statistical techniques used to analyze the data are discussed. These are contingency tables (cross-tabulations) and path analysis.

Contingency tables

Contingency tables are used in this study for two reasons. First, because of the applied nature of this study, contingency tables are useful in presenting results to decision makers and others. Secondly, contingency tables, with other techniques, can be used to explore and understand the nature of the data and how the different variables relate to each other, an exercise demanded (Bealer, 1983) before using advanced statistical techniques that are based on many assumptions. To make the contingency tables manageable and easy to understand, most of the variables will be collapsed into fewer categories using conventional techniques. These include looking for gaps in the empirical distribution of cases along the range of possible values of the variable and uniform or proportionate collapsing so that a certain proportion of cases is in each cell or each cell contains a certain proportion of the possible range of values (Bailey, 1982).

Path analysis

Path analysis was developed by Wright to study the direct and indirect effects of variables hypothesized as

causes on variables treated as effects. It is not intended to discover causes but to be "applied to a causal model formulated by the researcher on the basis of knowledge and theoretical considerations" (Pedhazur, 1982: 580). To use path analysis the following five assumptions should be met (Pedhazur, 1982: 582).

1. The relations among the variables in the model are linear, additive and causal. Consequently, curvilinear, multiplicative, or interaction relations are excluded.
2. Each residual is not correlated with the variables that precede it in the model.
3. There is one-way causal flow in the system. That is, reciprocal causation between variables is ruled out.
4. The variables are measured on an interval scale.
5. The variables are measured without error.

When path analysis is used carefully and special attention is given to the satisfaction of these assumptions, then its partial regression coefficients, when standardized, represent the best estimates of the coefficients relating the variables of interest (Miller and Stokes, 1975). The general use of path analysis in social sciences is questioned by some researchers (Miller and Stokes, 1975). In this study, path analysis is used to determine the direct and indirect effects of independent variables on the dependent variables in an analytical model that is based on a theoretical argument. This will help in developing policy recommendations that are based on a complete understanding of the causal mechanisms relating the different variables in the model.

Practical Problems

This section is based on the field experience during the collection of data in Sudan. Due to the lack of telephone services, inadequate mail service, and widespread illiteracy in most rural areas in developing countries, the only suitable data collection method is the face-to-face interview. Therefore, all problems of face-to-face interviews (for details and a more complete listing, see Bailey, 1982) should be given attention, but the following are crucial.

A major problem exists in establishing sampling frames in research conducted in developing countries. Basic statistics and information are absent and the available data usually are either out of date, inaccurate, or not easily accessible. To establish an accurate sampling frame, trust and cooperation must be obtained from government officials as well as informal rural leaders. In this study, a list of all farmers in the area could not be obtained from any of the local government departments. A trip was made to each selected village to obtain a list of the farmers' names. Finally, a more accurate sampling frame was established with the help of the village leaders. This was not possible without one of the interviewers' personal knowledge and acquaintance with some of the people in these villages.

Control over the interview environment, if not impossible, is difficult. Insisting on precise control over the interview environment may result in respondents refusing

to participate or respondents giving inaccurate information deliberately out of fear of the consequences of the interview. On deciding on the level of control over the interview environment, the researcher should carefully balance the losses and benefits. A clear explanation of the study objectives, interviewers being introduced by someone whom the respondent trusts, and complete disassociation from government (officials, cars) may reduce the problem. This study was conducted during the off-season when most of the people were in the village. Therefore, it was very common that while interviews were conducted other people came as visitors. Then it was very difficult to isolate the respondent because of the lack of other rooms or because of his insistence to be interviewed in the presence of others. In several occasions the interviews were conducted in the presence of other farmers who were not included in the sample or delayed until the visitor left. Information on livestock possession was very difficult to obtain and several respondents reported that they had no livestock at all, a fact hard to believe and related to fear of tax imposition.

Due to widespread illiteracy, problems with recall are very apparent. Studies that require information on yields, production costs, use of inputs, and labor should not be carried out after a long time after the agricultural season. In addition, many of the families migrate after harvest so the survey should be conducted during or immediately after

that time. Also, in one village it was found that most of the people migrated; that village was excluded from the sample and another one was substituted.

Linking the needed information (e.g., ages, dates) to certain well known events is helpful. Although this study was conducted shortly after the harvest season, information on prices at which crops were sold, time spent on working as agricultural laborers, and amount of hired labor were very difficult to get. Ages of the family's members was the most difficult to obtain and in many cases the respondents gave children's ages that were very close to their parents' ages. Also, abstract concepts and multiple choice (especially with many choices) questions should be avoided if possible. For example, in this study there was a question about whether the extension agent's advice was not useful at all, not very useful, useful, very useful. It was very difficult to explain the difference between the different answers and many respondents were not able to answer this question.

Research should not be conducted under a tight time schedule because of the many unforeseen events that might cause delay. During this study, no interviews were conducted on several days because of a marriage in one village and because it was a market day in several other villages. Another cause of delay was mechanical problems in the car. If a car is used, the driver should know mechanics and many spare parts should be taken as reserves. It took three days to arrive to the study area instead of one day

and that was because of a problem in the car that the driver was unable to fix. The car was towed to the nearest city to be fixed. In the field, a lot of delay was caused because of the driver's inability to fix minor problems and the lack of spare parts. On one occasion, a spare part was brought from Khartoum.

If possible, the interviewer should be from the same area and someone whom the respondents trust and respect. In this study, one of the interviewers was from the area and he was well known to many people in the villages. This helped in establishing the sampling frame and explaining the study purpose. A brief visit to the study area before the actual data collection will help in getting acquainted with local terms and measures. In the area where this study was conducted, there were specific terms and measures for hiring labor for the different agricultural operations. Laborers hired for planting and harvesting are paid per unit of time (Dahawa) and they are paid per unit of land (Mukhamas) in the weeding operation. Also, there were very specific terms used for participation in dispute settlements and for houses built from different materials. Knowing this will help in estimating the needed time for the survey.

CHAPTER IV. FINDINGS AND DISCUSSION

This chapter consists of three main sections. First, results from the analysis of contingency tables are presented. All bivariate relationships that were noted in the model reported in the previous chapter will be explored. This is followed by presentation and brief discussion of a zero-order correlation matrix. Then path analyses are discussed.

Contingency Tables

There is no statistically significant association between membership in a village agricultural cooperative and an economic index (total off-farm income excluding income from work as agricultural laborer) (Table 4). Although the group of households in the highest economic index category had the highest proportion of cooperative members, this group differed little from the others. This result suggests that the small farmers' cooperative programs in Western Sudan did not exclude poor farmers. This is further supported by the fact that only 8% of the 50 farmers who were not cooperative members in the sample indicated that the reason for not joining was the inability to pay the required membership fee.

Although households with low and high social standing indexes had similar proportions of cooperative members, households with medium social standing had somewhat higher proportions of cooperative members (Table 5). The

Table 4. Cooperative membership by economic index

Cooperative membership	Economic index			Totals
	Low (0-500)	Medium (500-1000)	High (1000-9300)	
No	27.9%	32.3%	21.7%	27.3%
Yes	72.1	67.7	78.3	72.7
Percentage totals	100.0	100.0	100.0	100.0
Frequency totals	61	62	60	183

Chi-square = 1.7; P = 0.420

Table 5. Cooperative membership by social standing index

Cooperative membership	Social standing index			Totals
	Low (0-1)	Medium (1-2)	High (2.18-11.57)	
No	33.8%	14.9%	28.6%	27.3%
Yes	66.3	85.1	71.4	72.7
Percentage totals	100.0	100.0	100.0	100.0
Frequency totals	80	47	56	183

Chi-square = 5.36; P = 0.068

differences between the three social strata of farmers regarding cooperative membership are not significant at the conventionally used statistical level (0.05).

Thus, although the households in the middle level of the economic index had the lowest percentage of cooperative members, households with medium social standing had the highest percentage of cooperative members. Evidently, the social and economic aspects of socioeconomic status may have different effects on the adoption of innovations. In this study, the households in the middle economic index category had the lowest percentage of cooperative members, a finding that supports Cancian's (1979) upper middle class conservatism thesis. On the other hand, households with medium social standing had the highest proportions of cooperative members, contrary to Cancian's argument. The observation that there is a somewhat modest association between cooperative membership and social standing but not economic index suggests that the small farmers' cooperative programs in Western Sudan were successful in overcoming the structural constraints that prohibit farmers from participation, but more effort is needed to educate them and increase their awareness about cooperatives.

There is a statistically significant degree of association between cooperative membership and using the extension service, marketing crops in the main market, use of pesticides, source of credit, number of days worked as agricultural laborer, agricultural income, and the living

expenditure index (Table 6). These associations are due in part to the fact that the Agricultural Bank of Sudan, which administered the small farmers' cooperative program, provided the cooperative members with some extension, credit, and marketing services.

From the modernization perspective, cooperatives will improve small farmers agricultural production through modernization of their agriculture (i.e., use of modern inputs, adoption of improved farming techniques). This was achieved to some extent since 53.4% of the farmers who were members of cooperatives received some extension contacts compared with 22.0% of others. Furthermore, nearly twice the proportion of cooperative farmers used some amount of pesticides compared with others.

From the dependency perspective, the cooperatives are expected to improve the small farmers' situation by releasing them from the different forms of exploitation by others. The cooperatives were successful to some extent in this regard since 78.2% of the cooperative farmers marketed some of their sesame in the Um Ruwaba market compared with 28.6% of farmers who were not cooperative members. By marketing crops in the Um Ruwaba market, which is the largest market in the area, instead of selling it to the village traders, the small farmers retain more of their crop value and the surplus value extracted from them by others is reduced. Furthermore, cooperative membership is associated significantly with reduction in borrowing from village

Table 6. Selected variables by cooperative membership

Selected variables	Cooperative membership		Totals
	No	Yes	
Extension service:			
None	78.0%	46.6%	55.2%
Some	22.0	53.4	44.8
Percentage totals	100.0	100.0	100.0
Frequency totals	50	133	183
Chi-square = 13.23; P = 0.001			
Marketing service:			
None	71.4	21.8	64.8
Some	28.6	78.2	35.2
Percentage totals	100.0	100.0	100.0
Frequency totals	49	133	182
Chi-square = 36.53; P = 0.001			
Hired labor:			
None	70.0	67.7	68.3
Some	30.0	32.3	31.7
Percentage totals	100.0	100.0	100.0
Frequency totals	50	133	183
Chi-square = 0.02; P = 0.900			
Use of pesticides			
None	78.0	56.4	62.3
Some	22.0	43.6	37.7
Percentage totals	100.0	100.0	100.0
Frequency totals	50	133	183
Chi-square = 6.33; P = 0.011			
Credit source:			
Local money lenders	68.8	4.8	13.3
Cooperative or friend	31.3	95.2	86.7
Percentage totals	100.0	100.0	100.0
Frequency totals	16	104	120
Chi-square = 43.69; P = 0.001			
Practicing "sheil":			
No	92.0	96.2	95.1
Yes	8.0	3.8	4.9
Percentage totals	100.0	100.0	100.0
Frequency totals	50	133	183
Chi-square = 0.64; P = 0.425			

Table 6 (continued)

Selected variables	Cooperative membership		Totals
	No	Yes	
Number of days worked as agricultural laborer:			
None	40.0	59.4	54.1
Some	60.0	40.6	45.9
Percentage totals	100.0	100.0	100.0
Frequency totals	50	133	183
Chi-square = 4.75; P = 0.029			
Agricultural income:			
Low (200-996)	56.0	27.8	35.5
Medium (1010-1988)	36.0	41.4	39.9
High (2015-9684)	8.0	30.8	24.6
Percentage totals	100.0	100.0	100.0
Frequency totals	50	133	183
Chi-square = 16.08; P = 0.001			
Living expenditure index:			
Low (46.5-149.71)	52.0	24.1	31.7
Medium (150-223.43)	26.0	36.1	33.3
High (225-1460)	22.0	39.8	35.0
Percentage totals	100.0	100.0	100.0
Frequency totals	50	133	183
Chi-square = 13.37; P = .002			

traders and local money lenders. About 95% of cooperative farmers who received credit in the 1987-1988 agricultural season obtained it from cooperatives or friends compared with a third (31.3%) of the farmers who were not members of cooperatives. Credit from local money lenders and village traders is a means through which excessive surplus value is extracted from small farmers, because local money lenders charge very high interest rates (Technoserve Inc., 1987).

There is no statistically significant association between whether a household hired labor or not and cooperative membership; this can be explained by the fact that the amount of credit provided to the cooperative farmers by the Agricultural Bank of Sudan was very small (ranged from L.S. 100 to L.S. 350) and was intended to cover part of their living expenses during critical times (planting, weeding, and harvesting) so that they can work on their farms instead of hiring themselves or their family members to others as agricultural laborers (Gregg and Ahmed, 1983; Technoserve, 1987). This was to some extent achieved since 59.4% of the cooperative farmers did not hire out any of their family members to others as agricultural laborers compared with 40.0% of the others. Generally, the "sheil" system was greatly reduced in the study area and only 4.9% of the total sample sold some of their crops through it. Only 3.8% of the members of cooperatives sold some of their crops through the "sheil" system compared with 8.0% of the others, a statistically insignificant difference.

The farmers in the sample were divided into three groups with regard to the agricultural income they realized in the 1987-1988 season. There is a significant association between household agricultural income and cooperative membership, with cooperative farmers concentrating more than the other farmers in the medium and high income groups. Also, the respondents were divided into three categories regarding their level of per capita living expenses. The cooperative farmers are in the medium and high living expenditure levels more frequently than were other farmers. In conclusion, there are significant differences between the farmers who are members in the cooperatives and the farmers who are not with regard to the extent of modernization of their agriculture and the degree of exploitation to which they are subjected; these differences culminate in significant differences in agricultural income and living standards.

There are no statistically significant differences between three economic-index groups with respect to percentage of farmers who received assistance from the extension service in 1987-1988, even though those in the highest economic category had the highest percentage (Table 7). This is not surprising since extension services were available only through the cooperatives and there was no statistically significant association between cooperative membership and the economic index. While similar percentages of the farmers with low and high economic

Table 7. Selected variables by economic index

Selected variables	Economic index			Totals
	Low (0- 500)	Medium (500- 1000)	High (1000- 9300)	
Extension service:				
None	59.0%	61.3%	45.0%	55.2%
Some	41.0	38.7	55.0	44.8
Percentage totals	100.0	100.0	100.0	100.0
Frequency totals	61	62	60	183
Chi-square = 3.81; P = 0.149				
Marketing service:				
None	30.0	46.8	28.3	64.8
Some	70.0	53.2	71.7	35.2
Percentage totals	100.0	100.0	100.0	100.0
Frequency totals	60	62	60	182
Chi-square = 5.6; P = 0.061				
Hired labor:				
None	77.0	82.3	45.0	68.3
Some	23.0	17.7	55.0	31.7
Percentage totals	100.0	100.0	100.0	100.0
Frequency totals	61	62	60	183
Chi-square = 22.78; P = 0.001				
Use of pesticides:				
None	65.6	64.5	56.7	62.3
Some	34.4	35.5	43.3	37.7
Percentage totals	100.0	100.0	100.0	100.0
Frequency totals	61	62	60	183
Chi-square = 1.22; P = 0.544				
Credit source:				
Local money lenders	11.1	16.2	13.2	13.3
Cooperative or friends	88.9	83.8	86.8	86.7
Percentage totals	100.0	100.0	100.0	100.0
Frequency totals	45	37	38	120
Chi-square = 0.46; P = 0.795				
Practicing "sheil":				
No	95.1	93.5	96.7	95.1
Yes	4.9	6.5	3.3	4.9
Percentage totals	100.0	100.0	100.0	100.0
Frequency totals	61	62	60	183
Chi-square = 0.63; P = 0.728				

Table 7 (continued)

Selected variables	Economic index			Totals
	Low (0- 500)	Medium (500- 1000)	High (1000- 9300)	
Number of days worked as agricultural laborer:				
None	44.3	45.2	73.3	54.1
Some	55.7	54.8	26.7	45.9
Percentage totals	100.0	100.0	100.0	100.0
Frequency totals	61	62	60	183
Chi-square = 13.31; P = 0.002				
Agricultural income:				
Low (200-996)	41.0	41.9	23.3	35.5
Medium (1010-1988)	41.0	41.9	36.7	39.9
High (2015-9684)	18.0	16.1	40.0	24.6
Percentage totals	100.0	100.0	100.0	100.0
Frequency totals	61	62	60	183
Chi-square = 12.65; P = 0.013				
Living expenditure index:				
Low (46.5-149.7)	29.5	38.7	26.7	31.7
Medium (150-223.43)	41.0	32.3	26.7	33.3
High (225-1460)	29.5	29.0	46.7	35.0
Percentage totals	100.0	100.0	100.0	100.0
Frequency totals	61	62	60	100
Chi-square = 6.92; P = 0.140				

indexers sold some of their sesame in the main market in the area, a somewhat lower percentage of households in the medium category of the economic index did. This could be explained in connection with the fact that the marketing service was provided only by the cooperatives and the farmers' stratum with a medium economic index was the category with the lowest percentage of cooperative members.

There is a significant association between whether a household hired labor and its economic index. Farmers in the high economic category were more likely to hire some labor during the 1987-1988 agricultural season. On the other hand, there is also a significant association between whether some of the household members worked as agricultural laborers for others during the 1987-1988 season and the economic index (Table 7). More specifically, in the 1987-1988 agricultural season, more than half of the farmers with low or medium economic indexes had some of their households' members working for some time as agricultural laborers for others compared with 16.7% of the farmers with a high economic index.

The percentage of farmers who used some pesticides did not differ significantly between the three groups of farmers. Nor were there statistically significant differences by credit source, the "sheil" system, or living expenditures.

The farmers in the sample were divided into three categories with regard to agricultural income and living

expenditures in the 1987-1988 agricultural season. The percentage of farmers with low and medium economic indexes in these categories are somewhat similar; they have significantly lower agricultural income and living expenses than farmers with a high economic index.

The respondents were categorized into three strata (low, 43.7%; medium, 25.7%; high, 30.6%) with regard to a social standing index. There are significant differences between these social strata with respect to several of the variables under consideration (Table 8). The percentages who marketed some of their sesame in the main market, who obtained credit, or who used the "sheil" system do not differ greatly among the three groups, however.

Although only 28.8% of the households with low social standing received extension services, 57.1% of the households with high social standing obtained such assistance. This is expected because these services were provided only through cooperatives and there was a somewhat significant association between social standing and cooperative membership.

The proportion of farmers who hired some labor also differed significantly in the three groups; 55.4% of the households with high social standing hired some labor in the 1987-1988 agricultural season compared with 16.3% of the households with low social standing. On the other hand, the households with low social standing had the highest percentage working as agricultural laborers for others.

Table 8. Selected variables by social standing index

Selected variables	Social standing index			Totals
	Low (0-1)	Medium (1-2)	High (2.18- 11.57)	
Extension service				
None	71.3%	42.6%	42.9%	55.2%
Some	28.8	57.4	47.1	44.8
Percentage totals	100.0	100.0	100.0	100.0
Frequency totals	80	47	56	183
Chi-square = 14.82; P = 0.001				
Marketing service:				
None	62.0	74.5	60.7	64.8
Some	38.0	25.5	39.3	35.2
Percentage totals	100.0	100.0	100.0	100.0
Frequency totals	79	47	56	182
Chi-square = 2.6; P = 0.272				
Hired labor:				
None	83.8	70.2	44.6	68.3
Some	16.3	29.8	55.4	31.7
Percentage totals	100.0	100.0	100.0	100.0
Frequency totals	80	47	56	183
Chi-square = 23.38; P = 0.001				
Use of pesticides:				
None	71.3	57.4	53.6	62.3
Some	28.8	42.6	46.4	37.7
Percentage totals	100.0	100.0	100.0	100.0
Frequency totals	80	47	56	183
Chi-square = 5.02; P = 0.084				
Credit source:				
Local money lenders	15.4	8.6	15.2	13.3
Cooperative or firned	84.6	91.4	84.8	86.7
Percentage totals	100.0	100.0	100.0	100.0
Frequency totals	52	35	33	120
Chi-square = 0.97; P = 0.616				
Practicing "sheil":				
No	92.5	95.7	98.2	95.1
Yes	7.5	4.3	1.8	4.9
Percentage totals	100.0	100.0	100.0	100.0
Frequency totals	80	47	56	183
Chi-square = 2.36; P = 0.310				

Table 8 (continued)

Selected variables	Social standing index			Totals
	Low (0-1)	Medium (1-2)	High (2.18- 11.57)	
Number of days worked as agricultural laborer:				
None	38.8	59.6	71.4	54.1
Some	61.3	40.4	28.6	45.9
Percentage totals	100.0	100.0	100.0	100.0
Frequency totals	80	47	56	183
Chi-square = 14.93; P = 0.001				
Agricultural income:				
Low (200-996)	48.8	25.5	25.0	35.5
Medium (1010-1988)	38.8	44.7	37.5	39.9
High (2015-9684)	12.5	29.8	37.5	24.6
Percentage totals	100.0	100.0	100.0	100.0
Frequency totals	80	47	56	183
Chi-square = 16.45; P = 0.003				
Living expenditure index:				
Low (46.5-149.7)	43.8	27.7	17.9	31.7
Medium (150-223.43)	31.3	34.0	35.7	33.3
High (225-1460)	25.0	38.3	46.4	35.0
Percentage totals	100.0	100.0	100.0	100.0
Frequency totals	880	47	56	183
Chi-square = 12.02; P = 0.017				

Although the differences between the three farmer groups with respect to the use of pesticides are not significant at the conventional level of statistical significance (0.05), only 28.8% of the farmers with low social standing used some pesticides while 42.6% and 46.4% of the farmers with medium and high social standing, respectively, did. There is also a significant degree of association between the household's social standing index and the level of agricultural income it realized. This could be a consequence of the differences in the use of agricultural inputs and services and the level of exploitation farmers faced in the different groups. More farmers with low social standing were in the low agricultural income group (48.8%) than the others, more farmers with medium social standing were in the group with medium agricultural income (44.7%), and the farmers with high social standing were equally concentrated in the groups with medium and high agricultural income (37.5% in each). Also, when the households in the sample were divided into three groups with respect to their per capita living expenditures, there was a significant degree of association with the household's social standing. About 43.8% of the households with low social standing had low per capita living expenditures compared with 17.9% of the households with high social standing. This could be a result of the differences in the agricultural income realized and the extent of exploitation and extraction of surplus value from farmers in the different groups.

There is a significant association between extension services received by small farmers and their use of pesticides; 56.1% of the households who received extension assistance used some pesticides compared with 22.8% of the others (Table 9). Also, there is a significant difference between farmers who received some extension service and those who did not regarding the agricultural income they realized (Table 9). While 30.5% of the farmers who received some extension help obtained high agricultural income, only 19.8% of the others did. This indicates the important role that the extension service can play in educating small farmers and improving their skills in using new agricultural inputs and improved farming techniques (Abd-Ella, 1979; Ekpere, 1984; Gregg and Ahmed, 1983).

Pests and diseases constituted one of the main problems hindering agricultural growth in the study area; 63.4% of the farmers in the sample reported that pests and diseases were among their main agricultural problems. Thus, the significant association between the use of pesticides and the level of agricultural income realized is not surprising (Table 10). Working as agricultural laborers for others is considered one of the main causes of low agricultural production on small, poor farms (Raynaut, 1980; Mooney, 1983). Supporting this argument, this study indicated a strong association between the time the household's members spent working as agricultural laborers for others and the agricultural income they realized (Table 11). On the other

Table 9. Selected variables by extension service

Selected variables	Extension service		Totals
	None	Some	
Use of pesticides:			
None	77.2%	43.9%	62.3%
Some	22.8	56.1	37.7
Percentage totals	100.0	100.0	100.0
Frequency totals	101	82	183
Chi-square = 20.0; P = 0.001			
Agricultural income:			
Low (200-996)	50.5%	17.1%	35.5%
Medium (1010-1988)	29.7	52.4	39.9
High (2015-9684)	19.8	30.5	24.6
Percentage totals	100.0	100.0	100.0
Frequency totals	101	82	183
Chi-square = 22.2; P = 0.001			

Table 10. Agricultural income by amount of pesticides used

Agricultural income	Amount of pesticides		Totals
	None	Some	
Low (200-996)	43.9%	21.7%	35.5%
Medium (1010-1988)	38.6	42.0	39.9
High (2015-9684)	17.5	36.2	24.6
Percentage totals	100.0	100.0	100.0
Frequency totals	114	69	183

Chi-square = 12.15; P = 0.002

Table 11. Agricultural income by time household's members worked as agricultural laborers for others

Agricultural income	Time worked as agricultural laborers		Totals
	Some	None	
Low (200-996)	42.9%	29.3%	35.5%
Medium (1010-1988)	48.8	32.3	39.9
High (2015-9684)	8.3	38.4	24.6
Percentage totals	100.0	100.0	100.0
Frequency totals	99	84	183

Chi-square = 22.14; P = 0.001

hand, there is a significant association between the amount of labor farmers hired from outside the family and the agricultural income they realized (Table 12). The majority of the farmers who hired labor obtained high agricultural income while the majority of the others obtained low agricultural income. One of the main reasons that prevent small farmers from retaining a large part of their crop value is the low price given to them by village traders (Gregg and Ahmed, 1983; Technoserve Inc., 1987). Hence, the significant association between the amount of sesame sold in the main market and the agricultural income realized (Table 13) is expected. There is no significant association between agricultural income and involvement in the "sheil" system (Table 14). This may be due to the fact that the "sheil" practice was drastically reduced in the study area; only 4.9% of the farmers in the sample sold some of their crops through the "sheil" system.

There are significant differences between farmers who obtained credit from local money lenders and those who obtained credit from friends or cooperatives with regard to the level of per capita living expenditures (Table 15). The majority of the farmers who obtained credit from local money lenders were in the group with low per capita living expenditures while the majority of those who obtained credit from cooperatives or friends were in the group with high per capita living expenditures. This could be due to the fact that borrowing from local money lenders reduces the portion

Table 12. Agricultural income by amount of hired labor

Agricultural income	Amount of hired labor		
	None	Some	Totals
Low (200-996)	41.6%	22.4%	35.5%
Medium (1010-1988)	44.0	31.0	39.9
High (2015-9684)	14.4	46.6	24.6
Percentage totals	100.0	100.0	100.0
Frequency totals	125	58	183

Chi-square = 22.43; P = 0.001

Table 13. Agricultural income by amount of sesame marketed in the main market

Agricultural income	Amount of sesame marketed in the main market		
	None	Some	Totals
Low (200-996)	68.8%	16.9%	35.2%
Medium (1010-1988)	29.7	45.8	40.1
High (2015-9684)	1.6	37.3	24.7
Percentage totals	100.0	100.0	100.0
Frequency totals	64	118	182

Chi-square = 55.76; P = 0.001

Table 14. Agricultural income by amount of crop sold under the "sheil" system

Agricultural income	Amount of crop sold through "sheil"		
	None	Some	Totals
Low (200-996)	35.6%	33.3%	35.5%
Medium (1010-1988)	38.5	66.7	39.9
High (2015-9684)	25.9	00.0	24.6
Frequency total	174	9	183

Chi-square = 4.04; P = 0.133

Table 15. Living expenditure index by source of credit

Living expenditure index	Source of credit		Totals
	Local money lenders	Cooperative or friend	
Low (46.5-149.7)	56.3%	17.3%	22.5%
Medium (150-223.43)	12.5	39.4	35.8
High (225-1460)	31.3	43.3	41.7
Percentage totals	100.0	100.0	100.0
Frequency totals	104	16	120

Chi-square = 12.63; P = 0.002

Table 16. Living expenditure index by agricultural income

Living expenditure index	Agricultural income			Totals
	Low (200-996)	Medium (1010-1988)	High (2015-9684)	
Low (46.5-149.7)	53.8%	31.5%	00.0%	31.7%
Medium (150-223.43)	32.3	39.7	24.4	33.3
High (225-1460)	13.8	28.8	75.6	35.0
Percentage totals	100.0	100.0	100.0	100.0
Frequency totals	65	73	45	183

Chi-square = 56.6; $P < 0.01$

of agricultural income available to farmers to spend on living expenses; local money lenders charge very high interest rates (Gregg and Ahmed, 1983). Since the farmers in this area depend heavily on agriculture for their livelihood (Ahmed, 1987), the significant association between agricultural income and per capita living expenditure is expected (Table 16). Although 46.6% of the farmers who obtained high agricultural income were in the group with high per capita living expenditures, only 13.8% of the farmers with low agricultural income were in that group.

Zero-order Correlations

Consistent with the hypotheses, the household economic index is positively correlated with the modernization variables (extension service, use of pesticides) and per capita living expenditures on one hand and negatively correlated with two of the exploitation indicators (working as agricultural laborer for others, interest rate paid) on the other hand (Table 17). None of these correlations is statistically significant at 0.01 level, however. Also, there is a positive correlation between the household economic index and cooperative participation, although again it is not statistically significant. The correlation between the household economic index and engagement in the "sheil" system is very weak (0.04); it is positive, which is contrary to the predicted relationship. Consistent with the literature (Raynaut, 1980; Stanfield and Whiting, 1972), there is a statistically significant positive correlation

Table 17. Zero-order correlations

	x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	x_9	x_{10}
x_1	1.00									
x_2	0.13	1.00								
x_3	0.19	0.28*	1.00							
x_4	0.10	0.31**	0.15	1.00						
x_5	0.15	0.23*	0.21	0.20	1.00					
x_6	0.22*	0.24*	0.20	0.11	0.30**	1.00				
x_7	-0.01	-0.30**	-0.20	-0.16	-0.17	-0.29**	1.00			
x_8	0.20	0.16	0.37**	0.19	0.36**	0.49**	-0.24*	1.00		
x_9	-0.01	-0.02	-0.39**	-0.08	-0.07	-0.12	0.18	-0.27*	1.00	
x_{10}	0.04	-0.08	-0.06	0.01	-0.02	-0.09	0.10	-0.11	0.03	1.00
x_{11}	0.23*	0.17	0.36**	0.17	0.42**	0.63**	-0.26*	0.91**	-0.22*	-0.12
x_{12}	0.21	0.26*	0.28*	0.23*	0.28*	0.24*	-0.24*	0.30**	-0.12	-0.15

- x_1 = Household's economic index.
 x_2 = Household's social standing index.
 x_3 = Household's cooperative participation index.
 x_4 = Extension service.
 x_5 = Amount of pesticides used.
 x_6 = Amount of hired labor.
 x_7 = Amount of time spent working as agricultural laborer for others.
 x_8 = Amount of sesame marketed in the main market.
 x_9 = Interest rate paid.
 x_{10} = Amount of crop sold through "sheil" system.
 x_{11} = Agricultural income.
 x_{12} = Household's per capita living expenditure.

*Significant at 0.01 or better.

**Significant at 0.001 or better.

x_8	x_9	x_{10}	x_{11}	x_{12}
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0					
4*	1.00				
8	-0.27*	1.00			
0	-0.11	0.03	1.00		
6*	0.91**	-0.22*	-0.12	1.00	
4*	0.30**	-0.12	-0.15	0.38**	1.00

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between the household economic index on one hand and the amount of hired labor and agricultural income on the other.

Unlike the economic index, social standing is significantly correlated with participation in a cooperative. This indicates the importance of structural constraints (Brown, 1981) as well as educational factors (Rogers, 1983) in the process of the adoption of innovations. As proposed, the social standing index correlates positively and significantly with the amount of hired labor, use of pesticides, extension service, and per capita living expenditures. Also, social standing is positively correlated with agricultural income and amount of crop marketed in the main market, although these relationships are not significant at the 0.01 level. On the other hand, social standing negatively correlates with the exploitation indicators (working as agricultural laborers for others, interest rate paid, and engagement in the "sheil" system) as expected, although only the first of these reaches statistical significance.

Consistent with the proposed hypotheses, participation in a cooperative is positively correlated with extension service, use of pesticides, and hired labor and negatively correlated with working as an agricultural laborer for others, engagement in the "sheil" system, and interest rate paid, although only the last one is statistically significant. Also, statistically significant positive correlations are noted between cooperative participation on

one hand and amount of sesame marketed in the main market, agricultural income, and per capita expenditures on the other.

As proposed, use of pesticides is positively correlated with agricultural income, while working as an agricultural laborer for others and interest rate paid are negatively related to such income; all are statistically significant. Relatively high correlations occur between agricultural income and the amount of hired labor and the amount of sesame marketed in the main market. The relationship between agricultural income and the amount of sesame marketed in the main market reflects major differences in prices of crops in the villages and the main market. In 1988, while the sesame prices in villages were around L.S. 70 per Kontar (1 Kontar = 100 lb.; \$1.00 = L.S. 4.1), the Agricultural Bank in Um Ruwaba was able to get L.S 95 per Kontar by marketing large quantities.

There is also a statistically significant positive correlation between agricultural income and per capita living expenditures. This indicates the importance of agriculture in the livelihood of the people in the study area.

The assumption of absence of multicollinearity is reasonably satisfied since there is no high correlation between any of the explanatory variables. Thus, more advanced statistical tests can be used (Pedhazur, 1982).

Path Analysis

Of the 35 relationships in the analytical model (Figure 6), 32 are in the proposed direction (i.e., have the expected sign). All the paths with unexpected signs are statistically insignificant but they raise concern about the effects of some variables in the model (Table 18).

One of these relationships is the positive effect of household economic index on the involvement in the "sheil" system. Theoretically, this relationship is expected to be negative (Mooney, 1983). Due to the prevalence of drought in the area in the last ten years (Abdella, 1987), agricultural production became very uncertain and the "sheil" system became very risky for village traders. Therefore, village traders are unwilling to buy crops through the "sheil" system. From discussion with farmers during the field work, it appeared that although the "sheil" system is very exploitative and unfair, it has not been readily available to poor farmers in recent years.

Expected relationships include the negative effects the measures of socioeconomic status (economic index and social standing) have on the interest rate paid. Negative direct effects are evident for household social standing and the extension service on agricultural income; both have positive total effects. Both social standing and extension involve sacrificing time to participate in social activities (participation in dispute settlement, serving on

organizations and committees, and attending extension agent's visits, which are usually held in the villages away from the farms). Thus, high social standing and using extension services imply less time available to spend working on the farm. The extension service will improve agricultural production through teaching farmers about improved farming techniques and production inputs (Abd-Ella, 1979; Ekpere, 1984). And a person with a high social standing sacrifices time to serve others and solves their problems but also receives special treatment and has many privileges; other people may provide that person with free or cheap labor and other production inputs (Pollet and Winter, 1978; Meillassoux, 1978). So, although the total and indirect effects of social standing and extension services on agricultural production are positive, their direct effects are negative.

Almost half of the explanatory variables in the model have a statistically significant total effect on the response variables (Table 18, Figure 6). Furthermore, the model explained a statistically significant portion of the variance of the dependent variables (R^2 s) (Table 18). Interesting is the relatively high explained variance (R^2) of agricultural income (68%) and per capita living expenses (29%), which are the ultimate dependent variables in the model. This indicates the potential of using variables drawn from more than one theoretical paradigm in improving

Table 18. Total, direct, and indirect effect of the explanatory variables on the response variables

Response variable	Explanatory variable	Total effect	Direct effect	Indirect effect
Cooperative participation (x_3)	Household economic index (x_1)	0.04	0.04	0.00
	Household social standing index (x_2)	0.32**	0.32	0.00
	R_1 square = 0.11; $F = 10.39$ ($p < 0.01$)			
Number of extension agent visits (x_4)	Household economic index (x_1)	0.09	0.09	0.00
	Household social standing index (x_2)	0.30**	0.30	0.00
	Cooperative participation index (x_3)	0.06	0.06	0.00
	R_2 square = 0.13; $F = 8.24$ ($p < 0.01$)			
Hired labor (x_5)	Household economic index (x_1)	0.28**	0.28	0.00
	Household social standing index (x_2)	0.39**	0.39	0.00
	Cooperative participation index (x_3)	0.02	0.02	0.00
	R_3 square = 0.29; $F = 23.05$ ($p < 0.01$)			
Amount of crop sold through "sheil" (x_6)	Household economic index (x_1)	0.04	0.04	0.00
	Household social standing index (x_2)	-0.10	-0.10	0.00
	Cooperative participation index (x_3)	-0.06	-0.06	0.00
	R_4 square = 0.02; $F = 0.95$ ($P = 0.42$)			

**Significant at 0.01 or better.

Table 18 (continued)

Response variable	Explanatory variable	Total effect	Direct effect	Indirect effect
Time household members worked agric laborers for others (x_7)	Household economic index (x_1)	-0.13	-0.13	0.00
	Household social standing index (x_2)	-0.20**	-0.20	0.00
	Cooperative participation index (x_3)	-0.11	-0.11	0.00
	R_5 square = 0.11; $F = 6.58$ ($p < 0.01$)			
Amount of pesticides used (x_{10})	Household economic index (x_1)	0.15*	0.14	0.01
	Household social standing index (x_2)	0.30**	0.24	0.06
	Cooperative participation index (x_3)	0.13	0.11	0.02
	Number of extension agent visits (x_4)	0.19**	0.19	0.00
	R_6 square = 0.22; $F = 11.52$ ($p < 0.01$)			
Interest rate paid (x_5)	Household economic index (x_1)	-0.06	0.06	0.00
	Household social standing index (x_2)	-0.10	0.10	0.00
	Cooperative participation index (x_3)	-0.44**	0.44	0.00
	R_7 square = 0.17; $F = 7.27$ ($p < 0.01$)			
Amount of crop marketed in the main market (x_8)	Household economic index (x_1)	0.15*	0.15	0.00
	Household social standing index (x_2)	0.17*	0.17	0.00
	Cooperative participation index (x_3)	0.09	0.09	0.00
	R_8 square = 0.09; $F = 5.51$ ($p = 0.01$)			

*Significant at 0.05 or better.

Table 18 (continued)

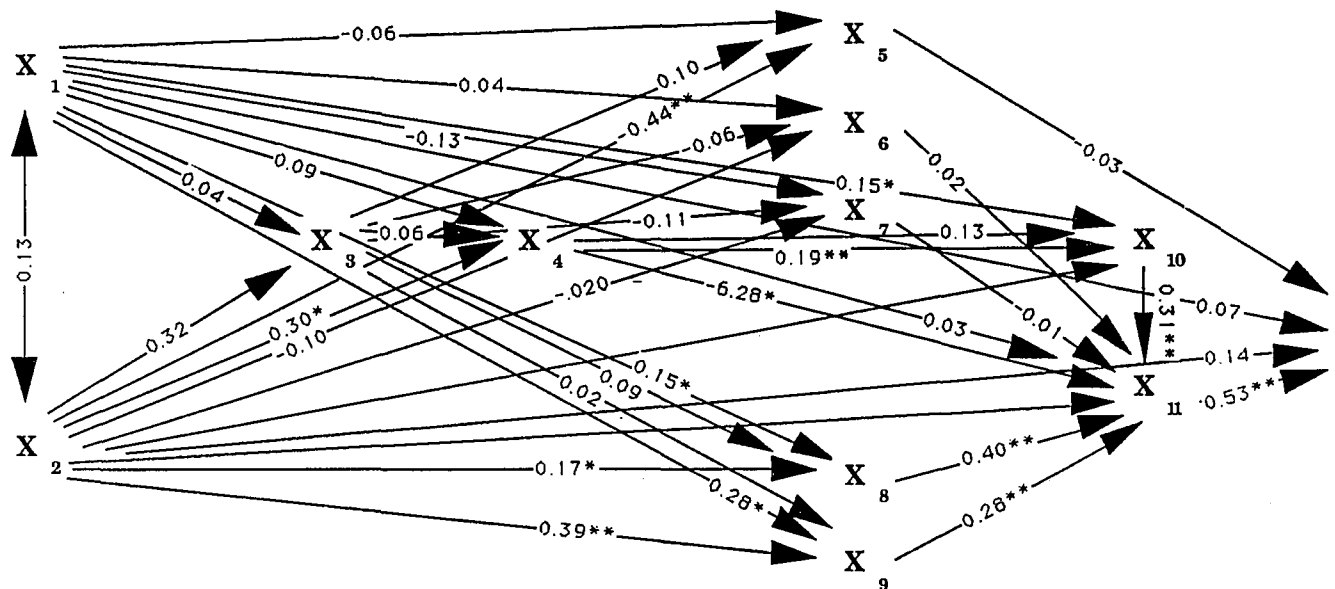
Response variable	Explanatory variable	Total effect	Direct effect	Indirect effect
Agri-cultural income (x_{11})	Household economic index (x_1)	0.22**	0.03	0.19
	Household social standing index (x_2)	0.23**	-0.04	0.27
	Cooperative participation index (x_3)	0.26**	0.00	0.26
	Extension agent visits (x_4)	0.12	-6.28E ^a	0.12
	Amount of pesticides (x_{10})	0.31**	0.31	0.00
	Crop sold through "sheil" (x_6)	-0.02	-0.02	0.00
	Amount of sesame sold in the main market (x_8)	0.40**	0.40	0.00
	Time household members worked as agricultural laborers for others (x_7)	-0.01	-0.01	0.00
	Amount of hired labor (x_9)	0.28**	0.28	0.00

R_9 square = 0.68; $F = 41.86$ ($p < 0.01$)

^a-6.28E = 0.00000028.

Table 18 (continued)

Response variable	Explanatory variable	Total effect	Direct effect	Indirect effect
Household living expenditures (x_{12})	Household economic index (x_1)	0.12	0.07	0.05
	Household social standing index (x_2)	0.17	0.14	0.03
	Cooperative participation index (x_3)	0.13	0.00	0.13
	Extension agent visits (x_4)	0.14	0.00	0.14
	Pesticides used (x_{10})	0.15	0.00	0.15
	Crop sold through "sheil" system (x_6)	-0.13	0.00	-0.13
	Time household members worked as agricultural laborers for others (x_7)	-0.09	0.00	-0.09
	Amount of hired labor (x_9)	0.01	0.00	0.01
	Interest rate paid (x_5)	-0.03	-0.03	0.00
	Agricultural income (x_{11})	0.53**	0.53	0.00
	R_{10} square = 0.29; $F = 3.65$ ($p < 0.01$)			

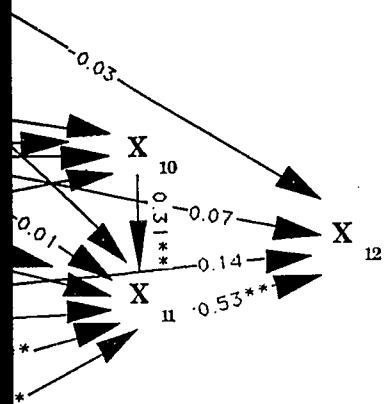


- X_1 Household's economic index
 X_2 Household's social standing index
 X_3 Household's cooperative participation index
 X_4 Number of extension agent visits
 X_5 Interest rate paid
 X_6 Amount of crop sold through "sheil"
 X_7 Number of days worked as agricultural laborer for others
 X_8 Amount of crop sold in the main market
 X_9 Amount of hired labor
 X_{10} Amount of pesticides used
 X_{11} Agricultural income
 X_{12} Household per capita living expenditures

* Significant at 0.05 or better

** Significant at 0.01 or better

Figure 6. Revised analytical model



ex

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prediction and explanation level in rural sociology (Bealer, 1983).

In the model proposed originally, the cooperative participation index is treated as an exogenous variable; it does not depend on household socioeconomic status; this model hereafter is referred to as the reduced model. The crosstabulations and correlations indicated a somewhat significant degree of association between cooperative and social standing index. Therefore, an alternative model, referred to hereafter as the full model, in which cooperative participation is treated as an endogenous variable depending on social standing and economic index, is examined.

Both the reduced and full models seem to fit the data in terms of the signs of the paths, total effects, and the generalized variance explained; they have 0.92 and 0.93 generalized variance explained, respectively. But when they are formally compared to each other using a chi-square test (Specht, 1975; Specht and Warren, 1976; Pedhazur, 1982), the full model is significantly better than the reduced model (chi-square = 23.53 ($p < 0.01$)). Therefore, the argument that cooperative participation in Western Sudan does not depend on the farmer's socioeconomic status is not upheld.

Summary of Findings

The participation and involvement of small farmers in agricultural cooperatives in Western Sudan does not depend on their economic status but it is affected significantly by their social status. Furthermore, farmers with medium social status tend to participate the most in cooperatives, a finding that contradicts the Cancian's (1979) middle class conservatism thesis.

The household's economic status has a statistically significant positive effect on the amount of hired labor, amount of pesticides used, amount of sesame sold in the main market, and agricultural income. Also, the household's economic status has positive but statistically insignificant effects on the extension services received by farmers and on their per capita living expenditures. Moreover, the household's economic status has a negative, although not significant, effect on the time the household's members worked as agricultural laborers for others. Surprisingly, the household's economic status is positively related to the amount of crop sold through the "sheil" system; this result did not reach statistical significance, however.

The household's social status has a statistically significant effect on the extension services received, the amount of labor hired, the amount of pesticides used, amount of sesame sold in the main market, and agricultural income. Social status also is significantly related to the time household members worked as agricultural laborers for

others; this is a negative relationship as predicted. Furthermore, it has a positive but not significant effect on per capita living expenditures and a negative insignificant effect on involvement in the "sheil" system. Also, surprisingly, social status has a negative but not significant direct effect on agricultural income.

Farmers' participation in cooperatives is negatively related to all measures of exploitation (interest rate paid, involvement in "sheil," and working as agricultural laborers for others). On the other hand, participation in cooperatives is positively related to extension services, amount of hired labor, amount of pesticides used, and amount of sesame sold in the main market. These effects culminated in a positive effect on the agricultural income received by farmers and on their per capita living expenditures.

In addition to socioeconomic status and participation in cooperatives, the amount of pesticides used, amount of sesame marketed in the main market, and the amount of hired labor are significant determinants of agricultural income in 1987-1988. But, agricultural income is the only significant predictor of the household's per capita living expenditures, a fact that reflects the importance of agriculture in the livelihood of the people in this area.

CHAPTER V. DISCUSSION AND IMPLICATIONS

This chapter is divided into three main sections. In the first section, the empirical results of the data analysis are discussed. The theoretical and policy implications of the study are included in section two. Finally, limitations and suggestions for further research are stated in the third section.

Discussion of findings

Although the economic aspect of farmers' status has no significant effect on their participation in cooperatives, the social aspect does. A potential explanation of this is that the cooperatives in Western Sudan were established by the Sudanese government with the help of the International Development Association to overcome the problem of the provision of collateral that usually leads to the exclusion of poor farmers from development programs (Ahmed, 1987). This was not preceded by a program to educate the farmers about agricultural cooperatives and their benefits, however (Abdella, 1987; Newiger, 1983). It is clear that this program failed to fully consider the importance of education for its success.

Although the cooperatives program in western Sudan succeeded in overcoming the problem of collateral provision, it was biased towards the relatively educated and those who possessed qualities of relatively high social status. This

supports the argument that both critical and functionalist perspectives are needed for a comprehensive and complete understanding of the process of development and the factors responsible for it (Blankson, 1987; Vandergeest and Buttel, 1988). The critical perspective is needed to explore the different types of exploitation the poor farmers face; this is what the cooperatives program in western Sudan tried to do. The functionalist (e.g., modernization) perspective is needed to examine the characteristics of poor farmers, so that measures that will change these qualities can be included in the development program; this is what the cooperative program in western Sudan failed to do. Furthermore, the group of farmers with medium social standing had the highest percentage of cooperative membership. This may be due to the fact that, unlike economic status, social status is based on a long history of work and achievement; it is less likely to be changed because of the adoption of new practices.

The fact that the household's economic status has a statistically significant positive total effect on agricultural income, mainly through positive effects on extension, hiring of labor, use of pesticides, and selling sesame in the main market and negative effects on working as agricultural labor for others and on the interest rate paid, is consistent with the literature (Pearse, 1984; Williams, 1982; Harriss, 1977; Raynaut, 1980; Stanfield et al., 1972). In traditional societies, limited resources and

services often are not available to poor farmers; when poor farmers do use them, they are provided on very exploitative terms. Furthermore, when development projects are introduced in such societies, they tend to exclude the poorest farmers (Peek, 1988). These results add to the concern that many scholars (Buttel and Newby, 1980; Williams and Williams, 1982; Gibbons et al., 1980; Newiger, 1983) have about development programs that are based only on functionalist or evolutionist paradigms that do not question the status quo; such programs will benefit the relatively rich and increase the income gap between rich and poor farmers. Consequently, the argument that rural development programs "should be linked to the necessary structural reforms to ensure that the poorest groups obtain an adequate share of project resources" (Peek, 1988:86) is supported.

Social status has almost exactly the same effect on agricultural income, although there is a minor difference in the mechanism through which this effect occurred. Social status had a negative direct effect on the farmers' agricultural income but this is more than offset by its indirect effect; it had a significant positive total effect on agricultural income. A possible explanation for this is that high social status implies sacrifice of one's time to serve others, but it also implies certain privileges (e.g., cheap or free agricultural inputs) (Meillassoux, 1978). Thus, if developmental equity is to be achieved, new

means and policies that ensure the inclusion of poor farmers in development programs have to be designed.

Although agricultural cooperatives in western Sudan provided limited resources and services to farmers, they had a statistically significant positive effect on agricultural income. This is achieved through its positive effect on modernization measures (extension service, use of pesticides, hiring labor) and reduction of exploitation of farmers by others (interest rate paid, working as agricultural laborers for others, marketing crops at low prices). Thus, despite the inconclusive nature of the literature on the usefulness of cooperatives as a means for sound development, the empirical findings of this study support the argument that at least cooperatives at the simple end of the cooperative continuum can be used successfully to include poor small farmers in development programs and, consequently, both growth and equity components of sound development can be achieved (Hyden, 1970; Okereke, 1970; Apthorpe, 1972; Hyden, 1973; Uphoff et al., 1979).

Beside socioeconomic status and participation in cooperatives, the amount of pesticides used, amount of sesame sold in the main market, and the amount of hired labor are significant determinants of agricultural income. By using pesticides and hiring labor, farmers were able to increase their agricultural production; and by marketing their crops in the main market, they were able to reduce the

surplus value extracted from them and retain more of their crops' value for themselves (Appelbaum, 1970; Blomstrom and Hettne, 1984; Lauer, 1973). This indicates that the problems of the traditional agricultural subsector in Sudan are of two types. First, this subsector lacks the use of modern agricultural inputs; the only modern input used by farmers in the study sample was pesticides. So, from the modernization perspective, with some modernization and improvement of the means of production and farming techniques, the agricultural production in this sector can be increased significantly; the effect of the use of pesticides supports this. Second, the agricultural income of farmers in the traditional subsector is reduced through different means of surplus value extraction--low prices for their crops, payment of high interest rate, and working as agricultural laborers for others. Therefore, from the dependency perspective, agricultural income of traditional farmers can be increased by reducing the surplus value extracted from them; this is supported by this study's empirical findings. Thus, results from this study support the argument that critical and functionalist perspectives should be used to complement and not to substitute for each other for a complete understanding of the process of development (Blankson, 1987).

On the other hand, agricultural income is the only significant predictor of the household's per capita living

expenditures. This emphasizes the importance of agriculture in the livelihood of rural people in Sudan (Bank of Sudan, 1986); this is true for most developing countries, of course (Food and Agriculture Organization, 1986). Therefore, any attempt to improve the living conditions of rural people in most developing countries should aim at developing agriculture in general and the poor farmers' sector in particular.

Theoretical and policy implications

Sound agricultural and rural policies concerning equity in the distribution of development benefits are important outcomes of growth (Uphoff et al., 1979; Caporaso and Zare, 1981). Consequently, it is essential to include small, poor farmers in development programs. To achieve this, and to satisfactorily examine, explain, and identify the factors and obstacles responsible for development, more than one theoretical perspective is needed (Picou and Nyberg, 1978; Blankson, 1987). A critical perspective (e.g., dependency) is needed to examine the uneven and exploitative relationships between developed and developing nations and between rich and poor in the same nation. A functionalist perspective (e.g., modernization) is needed to examine the institutions, technology, and values of the underdeveloped nations and poor people that constitute impediments to development.

The overall objective of this study was to explore the main determinants of farmers' income from agriculture in the traditional sector of Sudan, especially the success of cooperatives in influencing this income. The fact that modernization indicators (use of pesticides, extension service, hiring labor) and exploitation measures (marketing of crops in the main market) are among the main explanatory variables, coupled with the relative high explained variation of agricultural income, supports the argument that more than one paradigm is needed to explain and understand the processes of development and underdevelopment (Blankson, 1987; Doran et al., 1983; Vandergeest and Buttel, 1988). Thus, for a more complete understanding and determination of the factors responsible for development, particularly in developing countries, critical (e.g., dependency) and functionalist (e.g., modernization) perspectives should be used to complement and not substitute for each other. Also, the findings that farmers' participation in cooperatives did not depend significantly on their economic status and had a significant positive effect on their agricultural income upholds the argument that cooperatives at the simple end of the cooperative continuum can be used successfully as a means for a sound agricultural development. The observation that participation in cooperatives did not depend significantly on farmers' economic status but on their social status supports the thesis that Brown's (1981) market and infrastructure variant of the adoption perspective

should be used as a remedy for the individual-blame bias embedded in the traditional educational variant of the adoption perspective (Rogers, 1983) and not as an alternative perspective. The educational process will make the individual aware of the innovation. On the other hand, the availability and affordability of the innovation through policies based on the market and infrastructure variant will transform individual awareness about the innovation into an effective demand for the innovation. The empirical observation that the farmers group with medium social status had the highest cooperative membership while the farmers group with medium economic status had the lowest cooperative membership suggests that the economic and social aspects of socioeconomic status may affect the process of adoption and diffusion of innovations differently. In addition to Cancian's middle class conservatism thesis, a middle social class ambition may exist.

Methodologically, in an analogy to the triangulation process of data collection (Bailey, 1982), more than one statistical test was used. This was useful in understanding how the different variables related to each other; it was especially helpful in creating some information for applied settings while other techniques were more appropriate for testing hypotheses.

Based on the empirical findings, the following policies are recommended. First, since agricultural income is the

only significant determinant of the farmers' per capita living expenditures, attempts to improve their living conditions and standards should aim primarily at increasing their agricultural production and income.

Second, to increase the farmers' agricultural income, services and resources that aim at modernizing their agriculture (e.g., extension services, pesticides, improved seeds) and measures that will reduce their exploitation by others (e.g., marketing, storage, and credit services) should be provided to farmers. Agricultural cooperatives can be used effectively to achieve these ends and hence act as a means to develop the traditional agricultural sector (Uphoff et al., 1979; Okereke, 1970).

Third, the presence of a motivated and achievement-oriented personality is considered one of the most essential attributes of the modernization process (Germani, 1981; Harrison, 1985; Uphoff et al., 1979). One effective method to motivate and mobilize rural people is to use local values and religious teachings that are conducive to development (Goulet, 1989; Fuentes and Frank, 1989; Lauer, 1973; Ahmad, 1979). Therefore, in Muslim rural societies, such as the study area, the extension service in addition to its conventional role of educating farmers about new and improved farming techniques (Ekpere, 1984) should also emphasize local values and religious teachings that will motivate and mobilize farmers and create in them a spirit of achievement. Such aspects of the local cultures can

encourage them to work and stress the equity of development projects. Also, during the agricultural season, the extension service should be offered to farmers in their fields; this will reduce the amount of time they spend away from their agricultural work.

Fourth, animal-pulled equipment should be introduced in the traditional sector to facilitate operations such as land preparation and weeding which are time and labor consuming (Gibbon and Heslop, 1983).

Fifth, to counteract the desertification process, reforestation programs should be designed and encouraged; 30.1% of the farmers in the sample reported that desertification is one of the main problems facing their agriculture.

Finally, cooperative membership should be confined to individual villages to facilitate solidarity and cohesiveness among members through face-to-face interaction (Uphoff et al., 1979).

Study limitations and suggestions for further research

The study faces three shortcomings. First, since the data used were cross-sectional, change and causality are difficult to determine. Second, the data were collected from a population with a very high illiteracy rate. Problems with recalling appropriate information were very apparent; this represents reliability problems for the data used. In particular, information on agricultural income,

off-farm income, and living expenditures should be taken with caution. In the future, the use of interviewers from the same area and conducting research during the appropriate time (e.g., during harvesting time) may help to alleviate this problem. Finally, the fact that the data were collected from farmers in one geographical area and during conditions of drought makes it difficult to generalize these findings to this and other countries now and in the future.

In the future, longitudinal data must be gathered to assess in depth the effect of participation in cooperatives on small farmers' agricultural income and living conditions. Second, a comparative study of different types of cooperatives with different levels of resource pooling is needed to assess closely the validity of the argument that cooperatives at the simple end and not the complex end of the cooperative continuum are more successful in achieving development objectives. Third, the observation that members of the middle social class may be more innovative, because of ambition for social mobility, than members of high social class deserves further examination.

In conclusion, the empirical findings of this study indicate that, when designed properly (Peek, 1988), farmers' cooperatives can be used successfully as a means for sound agricultural development (i.e., to achieve growth with social justice). They can be used to ensure the inclusion of poor farmers in development projects and provide services

such as credit, storage, marketing; to reduce the surplus value extracted; to provide modern agricultural inputs and extension services; and to increase agricultural production.

BIBLIOGRAPHY

- Abate, Alula
1983 "Peasant associations and collective agriculture in Ethiopia: Promise and performance." *Journal of African Studies* 3:97-108.
- Abdella, A. Isah
1987 *Um Ruwaba Marketing and Credit Cooperatives: Practice and Understanding (in Arabic)*. Um Ruwaba, Sudan: The Agricultural Bank of Sudan.
- Abd-Ella, Mokhtar Mohamed
1979 *A Study of Family Farm Effectiveness*. Ph.D. dissertation, Iowa State University, Ames.
- Ahmad, Khurshid
1979 "Economic development in an Islamic framework." In K. Ahmad and Zafar Ansari, *Islamic Perspectives*. Jeddah, Saudi Arabia: Saudi Publishing House.
- Ahmed, A. Humeida
1987 *An Evaluation of Small Farmers Credit Program at Um Rawaba Branch of the Agricultural Bank of the Sudan*. Khartoum, Sudan: Department of Rural Economy, Faculty of Agriculture, University of Khartoum.
- Appelbaum, Richard P.
1970 *Theories of Social Change*. Chicago: Markham.
- Apthorpe, Raymond
1972 *Rural Cooperatives and Planned Change in Africa: An Analytical Overview*. Geneva: United Nations Research Institute for Social Development.
- Ashley, David and David M. Orenstein
1985 *Sociological Theory: Classical Statements*. Boston: Allyn and Bacon.
- Baali, Faud
1988 *Society, State, and Urbanism: Ibn Khadun's Sociological Thought*. Albany: State University of New York Press.
- Bailey, Kenneth D.
1982 *Methods of Social Research*. New York: The Free Press.

- Banaji, Jarius
1980 "Summary of selected parts of Kautsky's the agrarian question." In F. Buttel and H. Newby (eds.), *The Rural Sociology of the Advanced Societies*. Montclair (NJ): Allanheld, Osmun.
- Bank of Sudan
1986 *Bank of Sudan Twenty Seventh Annual Report*. Khartoum: Bank of Sudan.
- Barber, Bernard
1957 *Social Stratification*. New York: Brace and Company.
- Barker, Jonathan
1980 "Can the poor in Africa fight poverty?" *Journal of African Studies* 7:161-166.
- Base, Santi Priya
1961 "Characteristics of farmers who adopt agricultural practices in Indian villages. *Rural Sociology* 20:138-145.
- Bealer, Robert C.
1983 "Old wine in old bottles - So what is wrong with that? Some observation on metatheory in rural sociology." *Rural Sociology* 48:1-22.
- Blankson, Charles
1987 "The food crisis in West Africa: An examination of theoretical approaches." *Rural Africana* 27:1-17.
- Blomstrom, Magnus and Bjorn Hettne
1984 *Development Theory in Transition*. London: Zed Books Ltd.
- Bottomore, T. B. and Rubel, Maximilien
1956 *Karl Marx: Selected Writings in Sociology and Social Philosophy*. New York: McGraw-Hill.
- Brokensha, David
1981 "Review essay: Rural development and inequality in Zambia." *Journal of African Studies* 1:24-26.
- Brown, Lawrence A.
1981 *Innovation Diffusion: A New Perspective*. New York: Methuen.
- Buttel, Frederick H. and Howard Newby
1980 *The Rural Sociology of Advanced Societies: Critical Perspectives*. Monclair (NJ): Allanheld, Osmun.

- Cairncross, John
1980 Population and Agriculture in the Developing Countries. Rome: Food and Agriculture Organization of the United Nations.
- Cancian, Frank
1979 The Innovator's Situation: Upper-Middle-Class Conservatism in Agricultural Communities. Stanford: Stanford University Press.
- Caporaso, James A. and Behrouz Zare
1981 "Interpretation and evaluation of dependency theory." In Heraldo Munoz (ed.), From Dependency to Development: Strategies to Overcome Underdevelopment and Inequality. Boulder (CO): Westview.
- Cernea, Michael
1977 "Cooperative farming as strategy for integrated rural development." Journal of Rural Cooperation V:3-6.
- Chambers, Robert
1983 Rural Development: Putting the Last First. New York: Longman.
- Chilcote, Ronald H.
1984 Theories of Development and Underdevelopment. Boulder (CO): Westview.
- Clark, Robert P.
1982 Power and Policy in the Third World. New York: Wiley.
- Copp, James H.
1972 "Rural sociology and rural development." Rural Sociology 37:515-533.
- Cottrell, Allin
1984 Social Classes in Marxist Theory. Boston: Routledge and Kegan.
- Davis, John E.
1980 "Capitalist agricultural development and the exploitation of the propertied laborer." In F. Buttell and H. Newby (eds.), The Rural Sociology of the Advanced Societies. Montclair (NJ): Allanheld, Osmun.
- de Janvry, Alain
1981 The Agrarian Question and Reformism in Latin America. Baltimore: The Johns Hopkins University Press.

- Doran, Charles F., George Modelski and Cal Clark (eds.)
1983 North/South Relations: Studies of Dependency Reversal. New York: Praeger.
- Ekpere, J. A.
1984 "The evolving role of extension in agricultural development projects: The Nigerian experience." In Sulaiman M. Yassin et al. (eds.), Improving Extension Strategies for Rural Development. Selangor: Universiti Pertanian Malaysia Serdang.
- Ellman, Antony
1977 "Group farming experience in Tanzania." In Peter Dorner (ed.), Cooperative and Commune. Madison: The University of Wisconsin Press.
- Falk, William W. and Jess Gilbert
1985 "Bringing rural sociology back in." Rural Sociology 50:561-577.
- Food and Agriculture Organization (FAO)
1975 Credit for Agriculture in the Developing World. Rome: Food and Agricultural Organization of the United Nations.
1984 The State of Food and Agriculture. Rome: Food and Agriculture Organization of the United Nations.
1985 Committee for Development Planning Report on the Twenty-second Session. Rome: Food and Agriculture Organization of the United Nations.
1986 FAO Production Year Book. Rome: Food and Agriculture Organization of the United Nations.
- Filley, H. Clyde
1929 Cooperation in Agriculture. New York: Wiley.
- Flinn, William L.
1982 "Rural sociology: Prospects and dilemmas in the 1980s." Rural Sociology 47:1-16.
- French, Charles E., John C. Moore, Charles A. Kraezle and Kenneth F. Harling
1980 Survival Strategies for Agricultural Cooperatives. Ames: Iowa State University Press.
- Fuentes, Marta and Andre Gunder Frank
1989 "Ten theses on social movements." World Development 17:179-191.
- Garrett, Patricia
1984 "The relevance of structural variables for farming systems research." Rural Sociology 49:580-589.

- Gartrell, C. David and John W. Gartrell
1985 "Social status and agricultural innovation: A meta-analysis." Rural Sociology 50:38-50.
- Gartrell, John W., E. A. Wilkening and H. A. Presser
1973 "Curvilinear and linear models relating status and innovative behavior: A reassessment." Rural Sociology 38:391-411.
- Germani, Gino
1981 The Sociology of Modernization. New Brunswick: Transaction Books.
- Gibbon, David S. and Colin Heslop
1983 Animal-drawn Equipment Development in the Western Sudan Dry Savanna: The Hashasha and Atulba Toolbar. East Anglia, UK: University of East Anglia, School of Development Studies.
- Gibbons, David S., R. DeKoninck and Ibrahim Hassan
1980 Agricultural Modernization, Poverty and Inequality. Westmead (England): Teakfield Ltd.
- Glaser, Barney G. and Strauss, Anselm L.
1980 The Discovery of Grounded Theory: Strategies for Qualitative Research. New York: Aldine.
- Goss, Kevin F., Richard D. Rodefeld, and F. H. Buttel
1980 "The political economy of class structure in U.S. agriculture: A theoretical outline." In Frederick Newby and Howard Buttel (eds.), Sociology of Advanced Societies. Montclair (NJ): Allanheld, Osmun.
- Goulet, Denis
1989 "Participation in development: New avenues." World Development 17:165-178.
- Goyal, S. K.
1966 Some Aspects of Cooperative Farming in India with Special Reference to the Punjab. New York: Asia Publishing House.
- Gregg, B. Russell and Ahmed H. Ahmed
1983 Western Sudan, Kordofan Region, Agricultural Credit Study. Washington, D.C.: Checchi and Co.
- Hagen, E. E.
1962 On the Theory of Social Change: How Economic Growth Begins. Homewood (IL): Dorsey.

- Haller, Archibald O. and H. A. Saraiva
 1972 "Status measurement and the variable
 discrimination hypothesis in an isolated Brazilian
 region." *Rural Sociology* 37:325-351.
- Hamid, Naved
 1982 "Dispossession and differentiation of the
 peasantry in the Punjab during Colonial rule."
Journal of Peasant Studies 10:52-72.
- Hansen, David O. and Archibald O. Haller
 1973 "Status attainment of Costa Rican males: A cross-
 cultural test of a mode." *Rural Sociology*
 38:269-382.
- Harbeson, John W.
 1985 "Integrated agricultural development and
 agricultural policy in Liberia." *Rural Africana*
 22:3-24.
- Harrison, Lawrence E.
 1985 *Underdevelopment is a State of Mind.* Lanham (MD):
 Harvard University. The Center for International
 Affairs.
- Harriss, John
 1977 "Implications of changes in agriculture for social
 relationships at the village level: The case of
 Randam." In B. H. Farmer (ed.), *Green Revolution?*
Technology and Change in Rice Growing Areas of
Tamil Nadu and Sri Lanka. London: Macmillan.
- Hay, Donald G.
 1948 "A scale for the measurement of social
 participation of rural households." *Rural*
Sociology 13:285-294.
- Heffernan, William D.
 1972 "Sociological dimensions of agricultural
 structures in the U.S." *Sociologia Ruralis*
 12:481-499.
- Hozelitz, Bert
 1960 *Theories of Economic Growth.* Glencoe (IL): The
 Free Press.
- Hussain, M. Zaker
 1973 *Bamail Cooperative Farm.* Comilla, Bangladesh:
 Samabaya Press.

- Hyden, Goran
 1970 "Cooperatives and their socio-political environment." In C. G. Widstrand (ed.), Cooperatives and Rural Development in East Africa. New York: Africana Publishing Corporation.
- 1973 Efficiency Versus Distribution in Eastern African Cooperatives. Nairobi: East African Literature Bureau.
- International Fund for Agricultural Development (IFAD)
 1984 A Fund for the Rural Poor. Rome: International Fund for Agricultural Development.
- Inkeles, Alex
 1966 "The modernization of man." In M. Weiner (ed.), Modernization: The Dynamics of Growth. New York: Basic Books.
- Kahn, Joel S.
 1978 "Marxist anthropology and peasant economics: A study of the social structures of underdevelopment." In J. Clammer (ed.), The New Economic Anthropology. New York: St. Martin's.
- Karim, M. Bazlul
 1986 The Green Revolution. New York: Greenwood.
- Lamming, G.N.
 1980 Promotion of Small Farmers' Cooperatives in Asia. Rome: Food and Agriculture Organization of the United Nations.
- Lauer, Robert H.
 1973 Perspectives on Social Change. Boston: Allyn and Bacon.
- Laxminarayan, H. and Kissen Kanungo
 1967 Glimpses of Cooperative Farming in India. New York: Asia Publishing House.
- Lee, Coleman A. and C. Paul Marsh
 1955 "Differential communication among farmers in a Kentucky county." Rural Sociology 20:93-101.
- Malecki, Edward J., Lawrence A. Brown and Spector, Aron N.
 1976 "Adopter categories in a spacial context: Alternative explanations for an empirical regularity." Rural Sociology 41:99-118.

- Malton, Peter J.
 1979 "Income distribution among farmers in northern Nigeria: Empirical results and policy implications." East Lansing (MI): Michigan State University. African Rural Economy Program, Working Paper No. 18.
- Mann, W. S.
 1978 Cooperative Development in the Democratic Republic of Sudan. Khartoum: Khartoum University Press.
- Meillassoux, Claude
 1978 "Kinship relations and relations of production." In D. Seddon (ed.), Relations of Production-Marxist Approach to Economic Anthropology. London: Frank Cass.
- Mensah, Moise C.
 1977 "An experience of group farming in Dahomey: The rural development cooperatives." In Peter Dorner (ed.), Cooperative and Commune. Madison: The University of Wisconsin Press.
- Miller, Michael K. and C. Shannon Stokes
 1975 "Path analysis in sociological research." Rural Sociology 40(2):193-201.
- Ministry of Agriculture and Natural Resources
 1987 "Agricultural situation and outlook." October/November Report Value No. 7. Sudan: Department of Agricultural, Economic, Planning and Agricultural Economic Administration, Ministry of Agriculture and Natural Resources.
- Ministry of Finance and Economic Planning
 1987 Preparation Study of a Special Import Program for the Irrigated Subsector. Khartoum, Sudan: Ministry of Finance and Economic Planning.
 1988 The Four Years Program for Rehabilitation and Development. Khartoum, Sudan: Ministry of Finance and Economic Planning.
- Mishra, Satish C.
 1982 "Commercialization, peasant differentiation and merchant capital in late nineteenth century Bombay and Punjab." Journal of Peasant Studies 10:3-51.

- Mohamed, Mohamed E.
 1985 "The Sudanese cooperative movement." A paper presented at the Arab First Cooperative Conference (in Arabic). Khartoum, Sudan: The National Training Center for Cooperation.
- Mooney, Patrick H.
 1983 "Toward a class analysis of midwestern agriculture." *Rural Sociology* 48:563-584.
- Moulik, T. K., J. P. Harbouszky and C. S. Rao
 1966 "Predictive values of some factors of adoption of nitrogenous fertilizers by north Indian farmers." *Rural Sociology* 31:467-477.
- Nadarajah, Selvaraj
 1982 Factors Related to Farmers Participation in Agricultural Cooperatives. M.S. thesis, Iowa State University, Ames, Iowa.
- Naghizadeh, Mohammad
 1984 The Role of Farmer's Self-determination, Collective Action and Cooperatives in Agricultural Development: A Case Study of Iran. Tokyo (Japan): Institute for the Study of Languages and Cultures of Asia and Africa.
- Nelson, Lowry
 1969 *Rural Sociology: Its Origin and Growth in the United States*. Minneapolis: University of Minnesota Press.
- Newiger, Nikolas J.
 1983 "New approaches to cooperatives and other farmers' organizations." Rome: Food and Agriculture Organization of the United Nations. Land Reform No. 1/2:25-39.
- Norman, David W., David H. Pryor and Christopher Gibbs
 1979 "Technical change and the small farmer in Housaland, Northern Nigeria." East Lansing (MI): Michigan State University. African Rural Economy Program, Working Paper No. 21.
- Okafor, Francis C.
 1982 "A survey of rural cooperatives in Arambra State, Nigeria." *Journal of Rural Cooperation* X:151-154.

- Okereke, O.
 1970 "The place of marketing cooperatives in the economy of Uganda." In C. G. Widstrand, Cooperatives and Rural development in East Africa. New York: Africana Publishing Corporation.
- Opio-Odongo, J. M.
 1980 "The contribution of agricultural cooperatives to member welfare and community growth." Journal of Rural Cooperation VIII:23-38.
- Pearse, Andrew
 1980 Seeds of Plenty, Seeds of Want: Social and Economic Implications of the Green Revolution. Oxford: Clarendon Press.
- Pedhazur, Elazar J.
 1982 Multiple Regression in Behavioral Research. New York: Holt, Rinehart and Winston.
- Peek, Peter
 1988 "How equitable are rural development projects?" International Labour Review 127:73-89.
- Picou, Wells and Nyberg
 1978 "Paradigms, theories and methods in contemporary rural sociology. Rural Sociology 43:559-583.
- Pollet, Eric and Grace Winter
 1978 "The social organization of agricultural labour among the Soninke (Dyahunu, Mali)." In D. Seddon (ed.), Relations of Production-Marxist Approach to Economic Anthropology. London: Frank Cass.
- Putterman, Louis
 1985 "Extrinsic versus intrinsic problems of agricultural cooperation: Anti-incentivism in Tanzania and China." Journal of Development Studies 21:175-204.
- Raynaut, Claude
 1980 "The contribution of the anthropologist in the study of agricultural production systems (The case of Maradi in Niger)." Paper presented for the Workshop on Sahelian Agriculture, Department of Agricultural Economics, Purdue University, May 1980.
- Reed, Edward P.
 1977 "Introducing group farming in less developed countries." In Peter Dorner (ed.), Cooperative and Commune. Madison: The University of Wisconsin Press.

- Reeves, Edward and Tim Frankenberger
 1982 Farming Systems Research in Northern Kordofan, Sudan. Lexington (KY): University of Kentucky. Department of Sociology. Report No. 2.
- Rogers, Everett M.
 1983 Diffusion of Innovation. New York: The Free Press.
- Rostow, W. W.
 1971 The Stages of Economic Growth: A Non-Communist Manifesto. London: Cambridge University Press.
- Skocpol, Theda
 1977 "Wallerstein's world capitalist system: A theoretical and historical critique." American Journal of Sociology 82:1075-1090.
- Slamet, Yulius
 1984 Factors relating to farmers' participation in farm cooperatives. M.S. thesis, Iowa State University, Ames, Iowa.
- Specht, D. A.
 1975 "On the evaluation of causal models." Social Science Research 4:113-133.
- Specht, D. A. and R. D. Warren
 1976 "Comparing causal models." In D. R. Heise (ed.), Sociological Methodology. San Francisco: Jossey-Bass.
- Stanfield, J. David and Gordon C. Whiting
 1972 "Economic strata and opportunity as determinants of innovativeness and productivity in rural Brazil." Rural Sociology 37:401-416.
- Steeves, Allan D.
 1972 "Proletarianization and class identification." Rural Sociology 37:1-26.
- Stewart, Bonnie Ann
 1984 "Cooperatives and agricultural development: A case study of the credit and cooperatives Union of the Republic of Niger." Journal of African Studies 11:66-73.
- Stinchcombe, Arthur L.
 1961 "Agricultural enterprise and rural class relations." American Journal of Sociology 67:165-176.

- Stokes, C. Shanon and Michael K. Miller
 1985 "A methodological review of fifty years of research in rural sociology." *Rural Sociology* 50:539-560.
- Suchting, W. A.
 1983 *Marx: An Introduction*. New York: New York University Press.
- Technoserve Inc.
 1987 "Korag credit component: Elobeid baseline survey." Khartoum: Agricultural Bank of Sudan.
- Turner, Jonathan H.
 1982 *The Structure of Sociological Theory*. Homewood (IL): IL: Dorsey.
- Turner, Jonathan H.
 1985 *Herbert Spencer: A Renewed Appreciation*. Beverly Hills (CA): Sage.
- Uphoff, Norman T., John M. Cohen and A. A. Goldsmith
 1979 *Feasibility and Application of Rural Development*. Ithaca (NY): Cornell University, Rural Development Committee.
- Valenzuela, J. Samuel and Arturo Valenzuela
 1981 "Modernization and dependency: Alternative perspectives in the study of Latin American underdevelopment." In H. Munoz (ed.), *From Dependency to Development: Strategies to Overcome Underdevelopment and Inequality*. Boulder (CO): Westview.
- Vandergest, Peter and Frederick H. Buttel
 1988 "Marx, Weber, and development sociology: Beyond the impass." *World Development* 10:683-695.
- Van Dooren, P. J. and G. J. Kerkhoven
 1987 *The Role of Cooperatives in sudan's Agricultural and Horticultural Development*. Amsterdam: Koninklijk Instituut Voor De Tropen.
- Weber, Max
 1958 *The Protestant Ethic and the Spirit of Capitalism*. New York: Scribners.
- Wiarda, Howard J.
 1983 "Toward a nonethnocentric theory of development: Alternative conceptions from the third world development." *Journal of Developing Areas* 17:433-445.

- Wilkinson, Kenneth
 1986 "In search of the community in the changing countryside." Rural Sociology 51:1-17.
- Williams, C. E.
 1982 "The effect of technological innovation among rural women in Nigeria: A case study of 'GARI' processing in selected villages of Bendel State, Nigeria." Journal of Rural Development 5:247-257.
- Williams, C. E. and S. K. Taiwo Williams
 1982 "The challenges of agricultural and home economics extension in rural Nigeria." Journal of Rural Development 5:259-267.